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A Glance at the Contents—

Low-Temperature Carbonization.

Mr. Harald Nielsen puts forward a tentative scheme in an attempt to encourage closer co-operation between science, coal producers, gas interests, and low-temperature carbonization. [p. 483.]

Midland Junior Gas Association.

The Annual Meeting of this Gas Association was held at the Birmingham Council House on Thursday, May 7—Mr. W. Macnaughton presiding. After the business of the meeting Mr. F. L. Atkin, A.M.I.Mech.E., of the Industrial Section of the Birmingham Gas Department, read a paper dealing with the repairs, maintenance, and construction of industrial heating apparatus. [p. 504.]

Croydon Company's Co-Partnership Meeting.

The Ninth Annual Co-Partnership Meeting of the Croydon Gas Company was held in the North End Hall, Croydon, on Monday, May 11—Mr. William Cash (Chairman of Directors) presiding. The Chairman reviewed the year's work of the Company from co-partnership point of view; and long service awards were presented to ten co-partners. [p. 486.]

Western Junior Gas Association.

On May 2 members of this Association visited the works of Messrs. E. Cockey & Sons, Ltd., at Frome, after which Mr. A. Barrett delivered his Presidential Address, in the course of which he mentioned some of the difficulties he had to face after coming to the Frome Gas Company and some of his more recent experiences in fighting competition. Subsequently the Annual Meeting of the Association was held. [p. 490.]

Southern Association at Tottenham.

On Friday last members of the Southern Association of Gas Engineers and Managers had a full day. During the morning they inspected the Works of the Tottenham Gas Company, of which their President, Mr. H. C. Smith, is Chief Engineer. Then, at the invitation of the Chairman and Directors of the Company, they adjourned to Woodall House, where luncheon was served. Following this, a visit was paid to the Edmonton Works of Messrs. Thomas Glover and R. & A. Main, Ltd., where an interesting afternoon was spent in witnessing the manufacture of dry gas meters and cookers and fires. [p. 488.]

Shadows thrown by Waterless Holders.

In our "Continental Notes," information is given as to the length of the shadow cast at different times of the day at Essen in different seasons by a waterless holder 164 ft. in diameter and 262 ft. high. The shadow in the morning and evening (5 a.m. and 7 p.m.) in May and August is as long as 1300 yards, while at mid-day it is only 60 yards long. On the shortest day of the year, the minimum length of the shadow is 325 yards—at noon. The question of shadows may in some cases be of importance; for example, in the case of orchards in the vicinity of the holder. [p. 485.]

Engineer and Manager Required at Nottingham.

As will be seen from our advertisement columns, the Nottingham Corporation are inviting applications from qualified engineers (not exceeding 45 years of age) for the position of Engineer and Manager of their Gas Undertaking. The salary offered is £1750 per annum. [p. 511.]

The Chemical Constitution of Coal.

At the May monthly meeting of the London Section of the Society of Chemical Industry, Prof. W. A. Bone, F.R.S., gave an interesting lecture on "The Chemical Constitution of Coal." He emphasized the fact that the whole subject of coal must be treated as a problem of organic chemistry, and went on to review the results of some recent research work which has thrown new light on the chemical constitution of coal. [p. 503.]

Coal-Handling Plant at Cambridge.

In a paper before the Eastern Counties Gas Managers' Association at their meeting at Wisbech, Mr. H. R. Thomas, Assistant Manager to the Cambridge University and Town Gas Light Company, deals with recent alterations which have been made to the Cambridge Company's railway sidings to facilitate coal handling. The scheme was for a complete reconstruction of the siding, embodying new track with curves of 4-chain radius, which are necessary when dealing with coal wagons having a capacity of 20 tons. This type of wagon, he ventures to think, will be generally adopted in the future. [p. 498.]

Prince of Wales Visits Tube Works.

A photograph in to-day's issue shows the Prince at the first works he visited on his Midland tour, the Wellington Tube Works, Ltd., Great Bridge, Staffordshire. He was particularly interested in witnessing the manufacture of 1-in. wrought-iron tubes from the charging machine which feeds the strip into the furnace, through all the operations to the finished product, and he paid special attention to the rigid test to which the tubes are subjected. [p. 475.]

Presidential Address of Mr. J. Green.

We publish to-day the Presidential Address of Mr. J. Green, Engineer and Manager of the Wisbech Lighting Company, before the Eastern Counties Gas Managers' Association. In the course of his address, Mr. Green stated that in changing from the horizontal to vertical retorts they experienced complaints in regard to the quality of the coke. To meet this complaint, and with the idea of trying to prove that it was not warranted, a coke cutting plant was installed, and small graded samples in paper bags of about 28-lbs. weight were delivered to those who had complained, with a request that it should be given a further trial. These sample bags were also displayed in the showrooms and advertised in the local Press. The results have been very satisfactory, and quite a new business began to develop, for after a few weeks they found it necessary to order the bags by the 1000, and during the first six months they were selling at the rate of 1000 bags per week. [p. 493.]

EDITORIAL NOTES

B.C.G.A. Conference

THOUGH the Institution meeting is still to come, and though such a course is contrary to the familiar counsel "to be off with the old love before we are on with the new," it is really none too soon to bring to mind the Twentieth Annual General Meeting and Conference of the British Commercial Gas Association, which this year is to be held on a date somewhat earlier than usual. Many and varied are the arrangements to be made, and September will soon be upon us.

Exeter is the place; Mr. John E. Daw is the President; and Sept. 28 to 30 is the date. The programme is very attractive, and holds out firm promise of solid fare. The details are reproduced on later pages. Exeter is a beautiful city, and its Gas Company is in every way fully worthy of the high position which it holds in our great industry. A civic reception by the Mayor on the Monday afternoon will make everybody immediately feel at home; while a tour on the Tuesday afternoon of places of interest in Exeter—kindly arranged by the Chairman and Directors of the Exeter Gas Light and Coke Company—will prove absorbingly interesting and teach us much that we shall be glad to know. All this being so, a large and ready response may confidently be anticipated to the request for an intimation from those who intend to be present at the conference.

The Gas Unit

THERE has been a feeling in many quarters—as evidenced by the pages of the "JOURNAL"—that comparison between gas and electricity is complicated by the great difference in size of the Electrical Unit and the Gas Therm. Unfortunately, this feeling has led to the adoption by individual undertakings of smaller units of various sizes, which is likely to result in some confusion. At the meeting of the Southern Association of Gas Engineers and Managers last November, Mr. C. F. Botley stated—in reply to a suggestion by Mr. H. C. Smith that if a smaller unit was desirable the National Gas Council should agree upon the correct figure to adopt—that the Gas Charges Committee were taking the matter into consideration. We are glad to learn that a lead has now been given to those undertakings wishful to employ a small gas unit for the purpose of facilitating ready comparison of relative costs, which should result in that uniformity of procedure which is desirable.

The recommendation of the Gas Charges Committee of the National Gas Council, in conjunction with the Institution of Gas Engineers, is that this small unit should be additional to the therm, and not in substitution therefor, and that, in view of all the circumstances, a unit of 4000 B.Th.U. would be the most suitable. As we have already remarked, several different units have been adopted; but it is interesting to note that the figure of 4000 B.Th.U. decided upon was first suggested by Messrs. Radiation Ltd. in our columns in September of last year. Since that time the same figure has been adopted by Halifax, Hessle, and Queenstown. There may be other places also where it has been selected.

Interesting Problems

THERE can be no doubt about it that the managers of the smaller gas concerns find the problems with which they are faced of peculiar significance, because they have to be answered individually and they cover the whole range of gas manufacture, distribution, and service. The day may come when practically all the small works become absorbed into vast undertakings responsible for the supply of gas over extensive territory; there is, indeed, every reason to believe that this situation will eventuate. However, though specialization daily becomes of increasing importance, the day of the small gas undertakings is not yet by any means over. We were reminded of this on May 1 by Mr. A. C. Hovey, who, during the discussion of Mr. T. Law's paper before the North of England Association of Gas Managers, called attention to the fact that 65 p.ct. of the works in England have an output of less than 85 million c.ft. a year; while the corresponding percentages for Scotland and Ireland are 75 and 90 respectively. Now we are aware that such statistics are misleading if due regard is not paid to the relationship between the total output of these small concerns and the total output of the Industry, but they do indicate that the welfare of the Industry—its goodwill, its future prospects—depend very largely on the way in which those responsible for the conduct of these small undertakings regard their task. If they adopt an easy-going attitude, the ill effect on the prestige of gas is incalculable. If, on the other hand, they are determined to give their consumers good service, they can do this with extraordinary efficiency, for, after all, as far as manufacture is concerned, a large gas-works is only a series of small works. Moreover, the manager of the small undertaking has, by his personal contact with consumers, a peculiar and enviable advantage.

During the past few months we have had several quite illuminating accounts of the experiences and successes of the managers of the smaller works. To-day we publish yet another, and one by no means the least interesting. This is the Presidential Address of Mr. J. Green, Engineer and Manager of the Wisbech Lighting Company, to the Eastern Counties Gas Managers' Association. The Wisbech Company has an annual make of 102 million c.ft., and this, perhaps, approaches the "medium" class; but in light of modern conceptions we think that Mr. Green will not cavil at our suggestion that Wisbech is a comparatively small concern. We hope, too, that he will not cavil at our suggestion that the Company is run very efficiently on truly modern lines. He has an up-to-date carbonizing plant—an installation of Woodall-Duckham vertical retorts—and a waterless gasholder. Of both these plants, he speaks highly. In regard to the verticals, he points to increased yield of gas and bye-products, increased output of gas on the same ground space, maximum flexibility of output, lower labour costs and easier condition of operation, constant calorific value and specific gravity of the gas, and a coke specially suitable for the domestic market. But perhaps most important of all from the point of view of the small undertaking is that each retort is separate from the rest, which enables the variations in the weekly output to be met without upsetting the general carbonizing results. The installation has been at work for four years; and this is what Mr. Green has to say about the results: "The manufacturing labour cost has been more than halved, resulting in a saving of about £1200 per year, or 0·6d. per therm sold. The increased gas make per ton has enabled an increased demand of about 11 p.ct. to be met with an increased coal requirement of only about 5 p.ct. The resultant saving is of the order of 0·35d. per therm. Maintenance has been practically negligible. Apart from re-lining the producers, £10 has been spent in the four years on odd material for maintenance." This is "good going." As for the waterless holder, he explains that "from the moment it was brought into operation it has never given the slightest trouble." Since it has been in use the amount of water pumped from the district syphons has been greatly reduced; and Mr. Green speaks of the advantage of constant holder pressure from the manufacturing side as well as the distribution side.

Without going into further detail, we would emphasize

how well Mr. Green has dealt with his coke sales, for his practice—that of arranging for the sale of small quantities—is undoubtedly a good one. When he changed over from horizontal to vertical coke, consumers were naturally puzzled. So, to prevent any dissatisfaction, he installed a coke cutting machine, and arranged for the delivery of 28-lb. samples of graded coke to all who found any difficulty. These sample bags were displayed in the showrooms and at the same time advertised in the local Press. "The results," he states, "have been very satisfactory, and quite a new business began to develop, for after a few weeks we found it necessary to order the bags by the thousand, and during the first six months we were selling at the rate of a thousand bags a week." In brief, Mr. Green's address, with its reference, among the foregoing and other matters, to his belief in the maintenance of appliances, shows that our statement that the small gas undertaking can be a thoroughly efficient one, encouraging the best aims of our Industry, is not far wrong.

In Detail

THE paper read at the Eastern Counties Association last Thursday was by Mr. H. R. Thomas, Assistant Manager of the Cambridge University and Town Gas Light Company, who described recent alterations which have been made to the Company's railway sidings. This is a detailed account, and should prove valuable not only to those who may be about to embark on schemes somewhat similar, but also to those younger members of our Industry who desire to equip themselves with the necessary knowledge to enable them to undertake such work. The new siding at Cambridge is a "complete job." It is three times as large as the original one, and covers about 3 acres. There are two entrances from the main line; and this, Mr. Thomas explains, allows empty wagons to leave by one and full ones to enter by the other. There are also two entrances from the road. The coal handling plant (by Messrs. W. J. Jenkins & Co., Ltd.) has a capacity of 70 tons an hour; and an unusual type of locomotive, presenting several novel and interesting features, is described in the paper. All the coal is conveyed broken from the siding to the works by two "Sentinel" steam wagons of 5 and 6 tons capacity; and if anyone doubts whether this type of vehicle is economical, he ought to refer to the testimony given by Mr. Thomas. Total handling costs work out at 2·98d. per ton, divided as follows: Shunting, 0·5d.; weighing, tipping, breaking, and elevating, 1·07d.; and loading from hopper and conveying to works, 1·41d.

Mr. Thomas mentions that the new track was designed to deal with 20-ton wagons; and he expresses the opinion that this type of wagon will be generally adopted in the future. This is interesting in view of the answer which the National Gas Council received from the Railway Companies to a communication asking that rebates in respect of railway rates should be given to gas undertakings in cases where 20-ton wagons were provided. It appears that the Railway Companies are prepared to lend the necessary capital to undertakings for the conversion of their sidings, subject to repayment by the undertakings within a period of about fifteen years, with interest at 5½ p.ct. The Great Western Railway Company is, however, not prepared to increase its present rebates, and the other Railway Companies are not prepared to grant any rebates at all. Hence the National Gas Council feel that no inducement is held out to gas undertakings to proceed with the adoption of 20-ton wagons.

Rating of Public Utility Undertakings

THE Central Valuation Committee set up under the Rating and Valuation Act, 1925, has steadily, if slowly, pursued the immense task which it was the intention of the Legislature that it should undertake—the promotion of a greater uniformity in methods of assessment and rating practice generally. Of much interest to our readers is the memorandum which has been prepared by the Central Valuation Committee as a direct result of the representations made to the Committee in February, 1930, by a deputation consisting of representatives of gas, electricity, and water interests.

Briefly, the memorandum recommends that the undertaking of a public utility should first be valued as a whole, and the estimate of annual rent so arrived at, on the existing principles of valuation, and by reference to the accounts of the undertaking for "the last available five years immediately preceding the date on which the valuation is to come into force," should then be apportioned among the separate hereditaments comprised in the respective rating areas "in such a way that the sum of the individual apportionments is, as nearly as may be, equal to the cumulo net annual value" of the whole undertaking.

It is further recommended that the valuation and apportionment thereof among the rating areas concerned should normally be regarded as fixed for a period of five years, and that any review of the cumulo valuation or the apportionment, by reason of extension or alteration in the character or occupation of any part of the undertaking occurring during the quinquennium, should not disturb the cumulo net annual value or the general apportionment unless the cumulative increases or decreases (calculated, it is suggested, at the same rate per cent. on the capital cost of the new or discontinued works as that adopted in arriving at the cumulo valuation of the whole undertaking) exceed an agreed percentage of the total valuation.

These recommendations, if put into effect by the various rating authorities, should do much to remove a distinct disadvantage under which an undertaking extending into more than one rating area at present labours, and in this respect would appear to obviate the difficulties which now exist in the apportionment of the valuation of a public utility. Whether the scheme, when put into operation for the second valuation lists, under the Rating and Valuation Act, 1925, which the Central Valuation Committee have suggested should be brought into force, as far as possible, in 1934, will achieve this purpose, and whether the local authorities will carry out in their entirety the recommendations of the Sub-Committee, can be determined only after a practical test extending over some years. But it will be appreciated that at least a fine attempt has been made in some measure to recognize and smooth out the inequalities which are all too apparent. Reference is made in the draft memorandum to the demand for legislation specially dealing with the assessment of public utility undertakings, and the view is clearly expressed that if the more active consultation and collaboration between the various authorities which are now asked for does not result in the fulfilment of the Committee's hopes for closer co-operation, the question as to making representations to the Minister of Health (with the object of securing the necessary amending legislation) will need to be considered. In regard to the valuation of extensive properties, the memorandum suggests that, wherever possible, the apportionment of the cumulo valuation should be made by one valuer appointed by agreement between the various authorities concerned. This would appear to be a distinct advance on the practice which now obtains in many districts, and would seem to be the only way in which unequal apportionments may be obviated.

We would direct attention to the recommendation that, while such information as may reasonably be required under the 1925 Act shall be supplied by the company or corporation owning the undertaking to the valuer appointed on behalf of all the rating authorities into which the undertaking extends, in such cases the valuer (or joint valuers) should be authorized "to give all reasonable information" to the company or corporation as to the basis on which the cumulo net annual value has been ascertained, and the apportionment of that value. The absence of this information in the past has not only placed certain undertakings at a distinct disadvantage in appealing to the Assessment Committees, but has given rise to a suspicion in some instances that an effort has been made to depart from the "profits principle" of

valuation approved by the Courts. If acted upon, this recommendation would be of considerable value to all public utility undertakings. We hope that the Central Valuation Committee will publish these recommendations for the guidance of local authorities in rating gas and other special properties, for, although without legal force, this expression of the Committee's views cannot fail to have its influence on the deliberations of all rating authorities.

Pure and Applied

In this issue of the "JOURNAL" are two articles on coal. Prof. W. A. Bone discusses the constitution of this elusive substance in the light of modern research for which he is responsible—what may be termed "pure" research—while Dr. G. E. Foxwell writes on the importance of the petrographic composition of coal, and the influence of size of coal used in gas practice. Prof. Bone claims that recent researches employing the benzene extraction method not only afford the first unimpeachable quantitative evidence that the main coal substance has a benzenoid constitution, but they establish new experimental methods and technique for the exploration of the new vast field opened up. And he believes that had a tithe of the money expended upon low-temperature carbonization been devoted to fundamental researches upon coal and its industrial application, our country would not be in its present unhappy predicament.

Dr. Foxwell maintains that the time is approaching when gas-works will not select their coals simply because of their gas-making qualities, but will also pay attention to the character of the coke. Even now some gas managers select their coals on the principle that, while producing gas economically, they will also yield coke satisfactory to their consumers. The time will probably come before long when the production of a good quality of coke will be considered equally as important as the production of the proper quality of gas. We believe, too, that this time will come; and we think that, though the various properties of the banded constituents of coal should be considered closely in their relation not only to the gas, but to the coke produced, the first step in satisfactory coke manufacture lies in the carbonization of coal containing a minimum of ash. To-day—quite rightly, of course—thousands and thousands of pounds are being spent on the installation of coke screening and grading plant. How much is being expended on the fundamental principle of the solution of the problem of marketing good high-temperature coke—clean coal?

From several points of view Dr. Foxwell's article is likely to interest our readers. He calls attention, for example, to the fact that fusain, which in itself is entirely non-coking, but has a profound influence on the behaviour of the other constituents (which Prof. Bone, by the way, prefers to call by "their proper English names"), is concentrated in the finest material. Hence, if screened gas coal is purchased, and there is comparatively little fusain in the coal charged into the retorts, its beneficial effect will, of course, be lost. Uniform admixture of fusain with coking coal results in an increased hardness of coke and generally in an improvement in many other directions, notably in size. If a coke is being produced which contains too much breeze, the use of fusain, properly mixed, acts as a corrective. The importance of producing as little breeze as possible in the retorts is evident in view of the general adoption of coke cutting machinery. Dr. Foxwell remarks that the amount of fusain so required is very small, and would not noticeably affect the gas production. "A coal yielding 70 therms per ton, if mixed with 5 p.ct. of fusain yielding 50 therms per ton, would still give a total gas yield of 69 therms per ton. Probably it will be worth while losing a therm per ton in order to reduce the proportion of breeze manufactured."

Perhaps, however, the most interesting part of Dr. Foxwell's article is where he discusses the results of the investigations by the Institution of Gas Engineers' Research Sub-Committee and by the Fuel Research Board into the influence of size of coal on carbonization. It will be remembered that in the Institution's experiments the coal was graded into four sizes "in such a manner that the compositions of the four grades determined by analysis were practically the same." But, says Dr. Foxwell, it is "a matter of extreme difficulty, and probably of impossibility, to grade coal into sizes in this way without altering its petrographic composition." On the other hand, he thinks that the method of sizing adopted by the Fuel Research Board resulted in a series of experiments "undoubtedly the closest that has yet been made towards obtaining definite information concerning the influence of size in allowing the ready escape of the gases."

CORRESPONDENCE

Jubilee of the Vertical Gas Retort

SIR,—Fifty years ago Mr. William Young was experimenting with a miniature vertical retort in his Laboratory at the Clippens Oil Company Works, Paisley, to improve the vertical retorts then in use, which were very wasteful. I first met Mr. Young at a meeting of the North British Association of Gas Managers held on July 21, 1881, at the Institute of Engineers, Glasgow, where I read a paper on "Two New Processes of Gas Purification based on the direct utilization of its impurities in the production of commercial salts." In the discussion Mr. Young made a very long speech in admiration of the contents of the paper. During the excursion of the members on the steamer on Loch Lomond Mr. Young came to me and had a long talk, with the result that I accepted an appointment as Engineer at the Clippens Oil Company Works, where he was Manager. After a short time, and after I had become familiar with the run of the work in the Oil Works, and of the nature of his experiments, he asked me to go to his private residence at Priorsford, Peebles, to draw out his new vertical retort, 30 ft. high, to his instructions. After a month's stay there, I returned to the Oil Works at Clippens. The drawings and specifications were sent to the Patent Office at Glasgow. During their passage through the Patent Office they asked me to come up now and again from the Oil Works, to explain to them the working of the retort in accordance with the specification.

"Paraffin Young" (Mr. James Young, later Dr. James Young) was the first one to distil shale for the production of paraffin oil at Bathgate in 1850. The Bussey Low-Temperature Distillation Company, who have works near there, have erected a plaque to commemorate the event. At the same time Mr. Beilby, Chemist at the Oakbank Oil Works, was making similar experiments to Mr. Young, and lodged a Patent a short time after him. So they joined partnership, and called Mr. Young's retort the Young and Beilby retort.

The advent of this retort gave fresh life to the shale industry throughout the shale producing area. Companies were formed, and oil works sprang up like mushrooms over the area. Through the influence of Mr. Young I took out a bunch of retorts to Brazil, to distil a rich mineral there. My last visit to him was on July 24, 1904. He died on March 1, 1907, and was buried at Peebles on March 9, 1907, aged 67. Mr. Young told me in 1882 that he could see his way clear that the vertical retort would take the place of the horizontal retorts in the near future, which it is doing.

GEO. VALENTINE, F.C.S.,
Engineer and Analyst.
13, *Farm Avenue*,
Streatham, S.W. 16,
May 12, 1931.

PERSONAL

MR. WILLIAM CASH, JUNR.

Mr. William Cash, Junr., the son of the Chairman of the Croydon Gas Company, has been elected a Director of the Company. Mr. Cash is a Croydonian, and was educated at Haileybury and Balliol College, Oxford. While at Oxford he took an Honours Degree in History, and received Honourable Mention for the Stanhope Prize Essay. He is a Fellow of the Institute of Chartered Accountants and a member of the firm of Messrs. Cash, Stone, & Company. During the war he was in charge of the liquidation of the London Branch of the Direction der Disconto Gesellschaft, and on behalf of the Board of Trade paid visits to Spain.

Mr. Cash's activities are many. He is deeply interested in social welfare work, and has been a member of the Godstone Rural District Council and the Croydon Board of Guardians, and also of the Essex County Council. He was Parliamentary Candidate for the Saffron Walden Division of Essex, 1922, 1923, 1924, and 1929. He is well-known in the Gas Industry, being the Secretary of four Companies and an Auditor to a large number of others. He is also interested in the Parkinson Stove Company, Ltd., of which he is a Director.

The foregoing particulars are taken from the April issue of the "Croydon Co-Partner," which concludes its welcome to Mr. Cash in the following terms: "He brings to the Board the fruits of a wide experience in the Gas Industry, which must be of a great benefit to the Company. Because of his intimate knowledge of the relationship between employers and employees he was appointed a member of the Royal Commission which is at present investigating the terms and conditions of employment in the Civil Service, and he is, we understand, a very valuable member of that Commission."

DUNDEE'S NEW MANAGER.

Mr. JOHN WILSON, Gas Engineer and Manager to Motherwell Corporation, has been appointed Gas Manager at Dundee. There were 24 applicants for the post.

Mr. John Wilson is 45 years of age. He was educated at Hillhead High School, Allan Glen's School, and the Royal Technical College, Glasgow. He was appointed Assistant Gas Manager and Electrical Engineer to the Huelva Gas and Electricity Company, Ltd., Spain, in 1908, and in 1910 was appointed Assistant Engineer and Manager of Falkirk Corporation Gas Department. In 1915 he was appointed to a similar position at Greenock. On the amalgamation of Wishaw and Motherwell Mr. Wilson was appointed Gas Engineer and Manager to the Burgh.

At the Annual Installation Meeting of the St. Martin's Lodge of Freemasons, held on Monday, May 4, at the Temple, High Street, Fenny Stratford, W.Bro. J. Cook, who is Engineer and Manager at the Fenny Stratford Works of the British Gas Light Company, was installed Worshipful Master for the ensuing year.

Mr. D. BAGLEY has resigned from the Board of the Low Moor Coke Company, Ltd.

A vacancy on the Board of Directors of the Prescot and District Gas Company has been caused by the death of the Chairman, Mr. F. W. Halsall; and the Directors have elected Mr. JOHN E. HALL, the Engineer, Manager, and Secretary of the Company, to a seat on the Board, in recognition of his long service to the Company. Mr. Hall was appointed in 1897, when the output of gas was 17 million c.ft. per annum and the issued capital £15,800. The output is now 120 million c.ft. and the issued capital £72,695. The Rainhill Gas Company has just been absorbed, and an agreement has been entered into for the supply of gas in bulk to the Knowsley Estate of the Earl of Derby.

OBITUARY

L. R. ABBEY-WILLIAMS.

The burial took place at East Molesey Cemetery on Monday afternoon of Mr. Lewis Robert Abbey-Williams, of Meadow Bank, Fairfax Road, Teddington, who died, after a brief illness, on May 14, in his 80th year.

Mr. Abbey-Williams was an old and greatly esteemed resident of Teddington, and was a son of the late Mr. Lewis Williams, of Dolgelly, where the family have resided for many generations. His grandfather was one of the last private bankers in the Kingdom. By profession a Barrister-at-Law of the Middle Temple, the late Mr. Abbey-Williams had been long connected with the British Gas Light Company, Ltd., of which he was a Director. He was of a most retiring disposition, but had a genial and kindly nature which endeared him to all with whom he came in contact; and his death is deeply regretted.

The burial service was conducted by the Rev. A. Le Masurier, and the chief mourners were Mrs. L. R. Abbey-Williams (widow), Mr. Trevor Abbey-Williams and Mr. Thornton Abbey-Williams (sons), and Mr. Graham Wilkin (cousin).

Others at the cemetery included Mr. Henry Woodall (Chairman of the British Gas Light Company, Ltd.), Viscount Mersey and Mr. A. W. Brookes (Directors), Mr. G. J. Mumford (Secretary), Mr. Henry Willoughby Lovell, C.B.E., and Mrs. Nielsen.

The older members of the Institution of Gas Engineers, and their wives who remember her, will be sorry to learn that Mrs. Edith M. Hutchinson, the wife of Mr. Charles H. Hutchinson, died on Sunday, May 10, after a long and trying illness. Mr. Hutchinson is Managing Director of Messrs. Hutchinson Bros., Ltd., of Barnsley, and is, we believe, the oldest living member of the Institution, having been elected to the old British Association of Gas Managers in 1871.

Extensive Gas Exhibit at Buenos Aires

This photograph gives a general view of a few of the sections of the stand of the Primitiva Gas Company of Buenos Aires, Ltd., at the British Trade Exhibition, Buenos Aires. As will be seen, the extensive exhibit, which attracted a great deal of attention, is excellently laid out.

THE NEWS OF THE WEEK

The Newcastle (Staffs) Gas Committee have applied to the Board of Trade for additional borrowing powers up to £50,000.

A Slot Machine for the Sale of Mantles is to be purchased by the Smethwick Corporation Gas Department at the price of £10 10s. for use when the gas showrooms are closed.

A Settlement has been reached of the dispute at the Landore Works, near Swansea, of the British Mannesmann Tube Company, Ltd. The manufacture of seamless steel gas mains will be resumed almost immediately, as soon as the plant has been overhauled.

The Bradford Finance and General Purposes Committee have passed a resolution instructing the City Treasurer to prepare a report as to the practicability and desirability of collecting gas and electricity accounts quarterly instead of half-yearly as at present.

The Modernization of the Kirkcaldy Showrooms was approved at a meeting of the Kirkcaldy Town Council on May 11 at the suggestion of Mr. James Kincaid, the Engineer and Manager. The scheme comprises thoroughly up-to-date showrooms and the provision of new accommodation for clerical and technical staff and for fitters' workshops and stores, at an estimated total cost of £3600.

Some 50 Members of the Elland Chamber of Trade—comprising most of the leading shopkeepers in the district—paid an official visit recently to the works of the Elland-cum-Greetland Gas Company. They were welcomed by Mr. J. Bridge, the Engineer and Manager, and were divided into parties and conducted over the plant by members of the staff. Thanks were afterwards voiced for the visitors by Mr. J. Briggs, President of the Chamber.

A Visit to the Worcester Gas-Works was paid recently by members of the Worcester and District Branch of the Association of Engineering and Shipbuilding Draughtsmen. The arrangements were ably carried out by Mr. L. S. Adlington, the Engineer, and Mr. Cotterill, his Assistant. Considerable extensions are in progress, and the draughtsmen were enabled to obtain a clear understanding of the internal construction of the retort bench and furnaces. Repairs are being carried out to one of the gasholders which has been in continuous use for 50 years, and the visitors descended into the interior.

The Quantity of Gas sold at Hong Kong increased by 7 million c.ft., but remained 6 million less than for 1928. At Kowloon the sales were 12 millions higher than for 1929. The report of the Hong Kong and China Gas Company shows that the Company's financial operations were seriously affected by exchange, as the value of the dollar fell from 1s. 7½d. on Jan. 1 to 1s. 1d. on Dec. 31. The question of stabilizing the dollar is under consideration in the Colony; meanwhile, the Board are doing all that is possible to cope with the abnormal situation. The Directors recommend a dividend for the year at the rate of 5 p.ct. per annum, less income-tax. This was paid as an interim dividend on Oct. 17 last.

Street Lighting Suspension at Halifax.—In response to a call by the Finance Committee of the Halifax Corporation for a reduction of the Gas Committee's estimates (£22,150) by £2273, the Gas Committee agreed to this subject to street lighting being curtailed during the light nights of summer, in order to meet most of the reduction. The Watch Committee therefore reversed a former decision against street lighting curtailment, the Town Council approved the whole arrangement, and Halifax will be without gas street lighting entirely for eight weeks from May 27 to July 25. The negotiations on this matter have been proceeding between the various Committees for the past two months, and the Watch Committee and Town Council have varied their views between the two extremes of full winter lighting throughout summer and no lighting at all—the final decision.

The Annual Accounts of Drakes, Ltd., for the year ended Dec. 31, 1930, which are shortly to be issued, show satisfactory profits, taking into account the depressed state of the industry of the country and the fact that the Company sustained a loss last year. Substantial orders have been booked for the present year, including a carbonizing plant at Bristol, complete with coal and coke plant and stoking machine, carbonizing plants at Chelmsford and Gravesend, including coal and coke plants, carbonizing plants at Eastbourne and Yorktown, and a mechanical "Trefois" producer plant for the South Suburban Gas Company.

The Accounts of the South African Lighting Association for 1930 show that as from April 1, 1930, the price of gas at Port Elizabeth was reduced by amounts varying from 5d. per 1000 c.ft. for private consumers, to 8d. per 1000 c.ft. for large industrial consumers. The improved efficiency in manufacture and economies in labour have continued, but this has been offset by a reduction in the sale of gas attributable to the industrial depression in South Africa. Notwithstanding these facts the profits for the year approximate to those of 1929. The mortgage debentures at 8 p.ct., amounting to £25,000, fell due for repayment on Jan. 1, 1931. An offer was made to the holders for renewal on terms giving them a redeemable mortgage debenture at £95 5s. p.ct., bearing interest at 6½ p.ct., and the opportunity was taken to enlarge the issue to £30,000 in conformity with the resolution of the shareholders of May 22, 1903. After payment of debenture and other interest there remains a balance for disposal on profit and loss account (including the sum of £5431 11s. brought forward from 1929) of £11,167 1s. 9d. The Directors now propose the payment of a dividend for the year at the rate of 5 p.ct., less income tax at 3s. 4½d. in the £, and to carry forward to the year 1931, £6667 1s. 9d.

The Gas Industry and Its Restrictions.

In the necessary process of condensation of the remarks of Mr. R. W. Foot, the General Manager of the Gas Light and Coke Company, when he presided (in the absence of Sir David Milne-Watson) at the opening of the new gas showrooms at South Woodford, as reported in last week's issue of the "JOURNAL" (p. 422), we are sorry to find that the context suffered somewhat severely in one important particular.

Having referred to the fact that the Gas Industry was seriously hampered in many respects by old-fashioned legislation, Mr. Foot emphasized the point that the restrictions from which the Industry was seeking to free itself did not interfere in any way with the policy of developing new showrooms as was being done all over the country. It was in accordance with this policy that the Gas Light and Coke Company were building throughout their district showrooms such as those being opened on that occasion.

Medals for "No Accident" Lorry Drivers.

Drivers with many thousands of miles without accident to their credit were, on May 6, presented with National "Safety First" Awards by Dr. Charles Carpenter, President of the South Metropolitan Gas Company, at the Co-Partnership Institute, Old Kent Road.

Six "Metrogas" drivers received bars to their silver medals for six years' continuous service on the roads without accident, and three others received silver medals on completion of five years' safe driving. The majority of the men were drivers of heavy lorries, but among them were an ambulance driver and a taximan.

During the past seven years over two hundred "Metrogas" employees have entered for the competitions of the National Safety First Association, and the number gaining awards has risen from 62 p.ct. in 1925 to 97 p.ct. last year.

THE NEWS—*continued.*

Nottingham Gas Committee Chairmanship.

Resignation of Sir Albert Ball.

The announcement was forthcoming upon his authority at Nottingham, on Saturday, of the determination of Alderman Sir Albert Ball to resign his Chairmanship of the Corporation Gas Committee, a position which, with great advantage to the ratepayers, he has occupied for over twenty years. He has arrived at this decision as a protest against the pillorying process to which he has been subjected, and the attacks made upon the Committee, following revelations in the recent conspiracy cases.

The news has been received with great regret in the city, in which the services of Sir Albert, a former Mayor, have been of the highest value.

Standard Specification for Brazing Solder.

The British Engineering Standards Association have recently published a revised issue of the British Standard Specification No. 263 for Brazing Solder. This new edition has been prepared in order that an addition grade, intended primarily for solder supplied in the form of slittings and wire, might be incorporated. This grade is designated AA, and the three grades now covered by the specification are accordingly AA, A, and B. Another point of difference between the new issue and the one superseded is that the dimensions of certain of the sieves for testing granular solder have been modified so that they might be in exact agreement with the dimensions in the recently published British Standard Specification for Test Sieves (No. 410).—See "JOURNAL" for April 29, p. 271.

Copies of the new Specification (B.S.S. No. 263-1931) can be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, S.W. 1, price 2s. 2d. post free.

Cookery Demonstrations at Hereford.

Under the direction of the Hereford Corporation Gas Department, gas cookery exhibitions are being held in St. Peter's Church House, Hereford, until May 22. These practical demonstrations are being performed by Miss C. P. Hill, C.D.S., of Radiation Ltd., using a Radiation "New World" cooker with "Regulo" oven-heat control.

At the opening ceremony on May 11, the Mayor of Hereford (Councillor F. Lewis Smith) spoke of the new cooker as a great step forward in the service of the home, and said it had effected a revolution in cooking by gas. He thought the Gas Committee had done a great service to the community in Hereford by having introduced the "New World" cooker to the city and county. The Mayor was supported by members of the Corporation, Mr. Arthur Roberts (Engineer and General Manager of the Hereford Gas-Works), Messrs. H. A. Catton, C. G. Risley, and F. Worthington (representatives of Radiation Ltd.), Mr. J. H. Paterson (Gas Engineer, Ludlow), and Mr. G. H. Davies (District Superintendent, Hereford).

The demonstrations are being largely attended, and good business in the sale of cookers is being done at the Gas Offices.

The Prince of Wales at a Tube Works

Left to Right.—Mr. J. T. White, General Manager; H.R.H. The Prince of Wales; Mr. D. W. Turner, Chairman; Mr. W. H. Turner, Director; Mr. W. E. Bache, Chairman of the Chamber of Commerce.

H.R.H. The Prince of Wales, as a prelude to the important speech he delivered to British Industry following his return from his South American trip, visited some of the important works in the Midlands, together with his host, Lord Ednam.

The Prince of Wales has taken upon himself to act as a "liaison officer" between the Chambers of Commerce as representing British Industry, and our Overseas markets, and has pledged himself to "pull his weight" in the difficulties that are before us, and to assist to the utmost of his ability in the formidable task of re-capturing our export trade.

His action, therefore, in making himself familiar with the working conditions of industry by personal visits to different works is much appreciated by all.

The speeches in Birmingham and Manchester were a striking example of the first-hand knowledge which the Prince had of existing markets, conditions, and possibilities, and the ways and means that would have to be found for increasing British trade in this direction.

Our photograph shows the Prince at the first works he visited on his Midland tour, the Wellington Tube Works, Ltd., Great Bridge, Staffordshire, where he is seen obtaining first-hand information from the Chairman of the Company. He was intensely interested in witnessing the manufacture of 1-in. wrought-iron tubes from the charging machine which feeds the strip into the furnace, through all the operations to the finished product, and he paid special attention to the rigid test to which the tubes are subjected.

THE NEWS—*continued.*

Annual Conference of the B.C.G.A.

The Programme in Brief.

The Association's Twentieth Annual General Meeting and Conference will be held in Exeter on Sept. 28-30 (inclusive) under the Presidency of Mr. John E. Daw, J.P.

The following is a brief outline of the principal features of the interesting programme which has been arranged:

Monday, Sept. 28—

Afternoon, 4.30 p.m. Civic Reception of Visitors to the Conference, by the Mayor of Exeter.

Evening, 7.30 p.m. Reception of Members by the President; followed by an Address by Sir Banister Fletcher, F.S.A., F.R.I.B.A. (President, Royal Institute of British Architects).

Tuesday, Sept. 29—

Morning . . . . Annual Report and Statement of Accounts. Presidential Address.
Paper by Dr. L. Meredith Davies, M.A., M.D., B.Ch. (Oxon.), D.P.H. (Oxon.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), County Medical Officer for the County of Devon.
Discussion to be opened by Prof. Sir Leonard Hill, M.B., F.R.S.

Afternoon. . . . Tour of places of interest in Exeter, arranged by the Chairman and Directors of the Exeter Gaslight and Coke Company.

Evening . . . . Dinner by kind invitation of the Chairman and Directors of the Exeter Gaslight and Coke Company.

Wednesday, Sept. 30—

Morning . . . . PRIVATE CONFERENCE.
Papers by—
Mr. W. N. Westlake.
Mr. Stephen Lacey.
Discussion on Mr. Harold Whitehead's Confidential Report to the Association on his Survey of Selling and Service Methods in the Gas Industry.
Luncheon by the Members to the retiring President and the Directors of the Exeter Gaslight and Coke Company.

Brazil Week in Cardiff.

Free Coffee at Gas Showrooms.

Last week was what is known as "Brazil Week" in Cardiff. A considerable amount of business is done by Cardiff with that country, and in reciprocation the city booms the products of Brazil.

The Cardiff Gas Light and Coke Company played their part by lending their showroom window for demonstrations, while the back part was turned into a coffee room, where Brazilian representatives were in attendance, free cups of coffee being served. The result was to fill the showrooms, and among those who came in to have a cup of coffee were the Mayor of Cardiff (Alderman R. G. Hill Snook), Mr. Bordini (the Brazilian Consul), and the Portuguese Consul.

National Gas Council.

Meeting of Central Executive Board.

A meeting of the Central Executive Board of the National Gas Council was held at 28, Grosvenor Gardens, S.W. 1, on May 12, 1931—Sir DAVID MILNE-WATSON, LL.D., D.L., in the chair. A draft of the 13th Annual Report for submission to the Annual Meeting on June 30 was considered and approved.

GAS LEGISLATION.

The position as at present existing with regard to this matter was reported.

The position of certain Gas Companies in the Eastern Counties where considerable difficulty had been experienced in obtaining contract deliveries of coal was considered. The announcement in the Press with regard to the decision of the Midland District Scheme and the Lancashire District Scheme, under the Coal Mines Act, to increase the minimum price of coal to public utility undertakings was discussed.

USE OF 20-TON WAGONS.

It was reported that an answer had been received from the Railway Companies to a communication which had been sent by the Council, asking that rebates in respect of railway rates should be given to gas undertakings in cases where 20-ton wagons were provided. It appeared that the Railway Companies were prepared to lend the necessary capital to undertakings for the conversion of their sidings, subject to repayment by the undertakings, within a period of about 15 years, with interest at 5½ p.ct. The Great Western Railway Company was, however, not prepared to increase its present rebates, and the other Railway Companies were not prepared to grant any rebates at all. It was felt that, under this proposal, no inducement was held out to gas undertakings to proceed with the adoption of 20-ton wagons. It was, however, decided to circulate the information in the next Monthly Report.

GAS LIGHTING COMMITTEE.

Correspondence which had passed between the Society of British Gas Industries, the Institution of Gas Engineers, and the Council, with regard to the desirability of the appointment of a Joint Advisory Standing Technical Committee on Lighting was considered. The following suggestions were approved, viz.:

(1) That the existing Committee on Street Lighting be enlarged.
(2) That its title be the "Joint Advisory Standing Technical Committee on Lighting."
(3) That the terms of reference be extended to include all forms of Gas Lighting.

HULL PUBLIC LIGHTING.

It was reported that an inquiry had been held on April 16 before an Inspector of the Ministry of Health, with regard to the application of the Corporation of Hull for sanction to borrow £67,000 for the purpose of converting the public lighting from gas to electricity. Both the British Gas Light Company and the East Hull Gas Company were represented at the inquiry for the purpose of resisting the application. The decision of the Ministry of Health has not yet been given.

BRITISH INDUSTRIES FAIR.

Mr. W. J. Sandeman and Mr. L. E. Clift were unanimously reappointed representatives of the Council on the Gas Industries Section Committee, in connection with arrangements which are being made for the holding of the British Industries Fair at Birmingham in 1932.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

May 21.—MIDLAND ASSOCIATION.—Meeting at Wellington.
May 21.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION.—Annual Meeting in Cardiff.
May 28.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1.
June 2-4.—INSTITUTION OF GAS ENGINEERS.—London Conference.
June 3.—ASSOCIATION OF STATUTORY INSPECTORS OF GAS METERS.—Annual Meeting at the County Hall, Westminster Bridge, 10.15.
June 20.—LONDON AND SOUTHERN DISTRICT JUNIORS.—Summer visit to Isle of Thanet Gas Light and Coke Company, Margate.
June 26.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.
June 30.—NATIONAL GAS COUNCIL.—Thirteenth Annual General Meeting.
June 30.—FEDERATION OF GAS EMPLOYERS.—Annual Meeting.
Sept. 10.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Rothesay.
Sept. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Exeter.
Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

The Bradford Street Lighting Fight.

For many weeks a test of comparative costs and lighting values of modern gas versus electric street lighting was conducted in certain Bradford streets with a view to a special Lighting Sub-Committee of the Corporation coming to a decision as to the future street lighting on all except tramway and trackless trolley car routes (which are now lighted by electricity). All the remainder of the streets are lighted by gas, and, as was mentioned in last week's "JOURNAL," the Gas Committee made an offer of service and maintenance of the latest type of clock-controlled lighting on such terms that the Special Committee recommended the adoption of the scheme.

The matter was debated in the full Council some time ago and on pressure from the Electricity Committee—who

said they had some more facts to bring forward—was deferred; but the recommendation in favour of gas was reaffirmed and brought to the City Council again on May 12. At that meeting the Electricity Committee moved that the recommendation be again referred back so that they could complete a report on an electricity scheme. The Street Lighting Sub-Committee, however, stood firmly by their recommendation, stating that there was little or nothing between gas and electricity as street illuminants by the latest methods, but gas was very decidedly the cheaper, and would cost Bradford 11s. per point less than with electricity.

The motion for reference back was moved by Alderman J. W. Longley, Chairman of the Electricity Committee, seconded by Mr. R. C. Ruth, and supported by Mr. L. Jessop, a professional electrical contractor. The Street Lighting Sub-Committee recommendation was sponsored by Mr. G. R. Carter, as Chairman of the Sub-Committee, and seconded by Mr. J. Lennon, Deputy-Chairman of the Corporation Finance Committee, who pointed out that by the use of gas instead of electricity there would be a saving of about £7000 per year. The recommendation accepting the gas offer was carried by the Council.

Presumably this, at long last, may really be regarded as the final decision.

Woodall-Duckham Work in 1931.

Since the beginning of the year the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have received the following orders for installations of "W-D" continuous vertical retorts:

From the Oldham Corporation Gas Department an order has been received for an installation comprising twenty-eight 103 in. retorts with a net carbonizing capacity of 234 tons of coal a day allowing for retorts scurfing. The retorts are to be heated by a battery of seven producers situated at floor level at one side of the bench. Two 100 ton per hour gravity-bucket conveyors will encircle the bench. One retort will be isolated to act as a test plant, with a complete equipment including a condenser, an exhauster, a tar extractor, a washer, and a meter.

The Shrewsbury Gas Light Company have placed a contract for an installation of twelve 62 in. retorts, to be erected in an extension of the existing retort house. The retorts will be capable of carbonizing 80·4 tons of coal a day, and will be heated by means of two producers at floor level at one side of the bench. The contract also includes a 25-cwt. steam-driven lift, and a horizontal induced-draught return tube waste-heat boiler with steam turbine fan drive.

The Sittingbourne Gas Department have ordered an installation of six 44 in. retorts, to be erected in an extension of the existing retort house. The retorts will be heated by means of two producers at floor level at the side of the bench. The plant will be capable of carbonizing 25·2 tons of coal a day. The contract also includes a 25-cwt. steam driven lift and a waste-heat boiler of the horizontal fire-tube natural draught type.

From the Lewes Gas Company a contract has been received for an extension of the existing installation by two 53 in. retorts, bringing the total number of retorts to eight. A horizontal fire-tube natural draught waste-heat boiler is also to be supplied, and provision is to be made for augmentation of the heat in the waste gases by means of producer gas.

The Woodall-Duckham Company have also received orders for reconstruction of installations at Poole and Bradford.

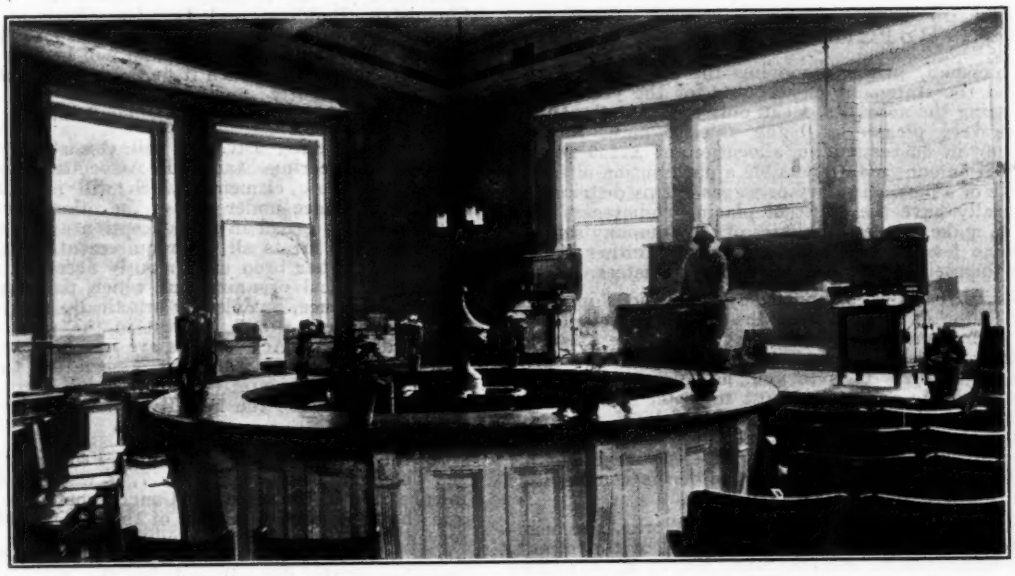
The Compagnie Generale de Construction des Fours have received an order for eight 80 in. "W-D" continuous vertical retorts, to be erected at Grenoble (France). The capacity of the plant will be 52 tons per day.

"W-D" Intermittent Vertical Chambers and Tar Plants.

The Croydon Gas Company have placed an order with the Woodall-Duckham Company for a second installation of 36 "W-D" intermittent vertical chambers, arranged in six settings of six chambers in the existing retort house as an extension of the first installation. The daily carbonizing capacity of the new plant will be 230 tons of coal. The existing coke-handling plant is to be supplemented by the provision of a new telpher and track.

The United Steel Companies have placed an order with the Woodall-Duckham Company for a T.I.C. tar treatment plant capable of dealing with 30 to 35 tons of crude tar per 24 hours. This plant, which will be erected at the Orgreave Bye-Product Plant, will be used for the production of road tars.

Successful Exhibition at Matlock Bath



A joint display was staged by the Matlock Urban District Council and the Matlock and District Gas Company in the Pavilion, Matlock Bath, from April 15 to 25. The exhibition was promoted by the Matlock and District Chamber of Trade, and it is estimated that the visitors numbered about 10,000. Our photograph shows the Pump Room, in which demonstrations of cooking with the "New World" cooker were given by Miss Longworth, of Messrs. Radiation, Ltd. The demonstrations were exceptionally well attended each afternoon and evening.

THE NEWS—continued.

Swansea Gas Light Company.

Superannuation and Co-Partnership Schemes.

The Annual General Meetings of the Superannuation Scheme and of the Co-Partnership Scheme of the Swansea Gas Light Company was held on Wednesday, April 22, at the Y.M.C.A. (Minor Hall), St. Helen's Road, Swansea. Mr. Hugh Bellingham (Director)—in the absence through illness of the Chairman, Mr. Ernest H. Leeder—presided, being supported by Messrs. J. F. Coonan, Francis Hobbs, and W. H. Ashmole (Directors), Mr. W. H. Johns (Engineer and Manager), Mr. Ernest Ablett (Secretary and Assistant Engineer), and by members of the Committees of both Schemes.

SUPERANNUATION SCHEME.

Prior to moving the adoption of the report and the accounts for the year ended Dec. 31, 1930, the Chairman said: During the past year, and for the first time since the Scheme has been in operation, the retirement of members has been enforced. Two years ago it was decided that it was desirable that effect should be given to the principle of compulsory retirement, and while, owing to the finances of the Scheme, it was not expedient to put into operation the Clause calling for retirement at the age of 65 years, until after the Scheme had had an untapped period of 10 years, yet it was decided to call, as from Jan. 1, 1930, for the retirement of members as and when they attained the age of 70 years. No fewer than eleven members of 70 years of age or more were called upon to retire, and the amount paid out as superannuation allowances during the year has consequently reached a level higher than we have previously experienced. Throughout the year 24 members were in receipt of pensions, and the total amount received by them as allowances out of the Scheme was £922 15s. 11d.

Actually, on Jan. 1 of this year, the amount being paid out as superannuation allowances was at the rate of £1089 8s. per annum, and the fact that such an amount was possible is, in our opinion, truly remarkable. Your Committee have also drawn your attention to the fact that on this same date the income derived from the investments of the Scheme, is more than sufficient to meet this expenditure on pensions, being the handsome figure of £1134 per annum. Taking into consideration the amounts paid as additional grants by the Company, since the Scheme was inaugurated in 1924, no less than £3599 16s. 10d. has been received by pensioners. The value of investments has risen to £19,710, and the fund value to £20,386.

Mr. A. H. Shepherd (Chief Salesman) seconded the proposition, which was put to the meeting and carried unanimously.

CO-PARTNERSHIP SCHEME.

The Chairman, prior to moving the adoption of the report and the statement of accounts for the year, said: In submitting the accounts, I can only say that the Directors were very pleased at being able to make for the fourth year in succession an allocation of £2250 to the fund, which amount makes possible a distribution of bonus at the rate of 5 p.ct. on salary or wages. This distribution will naturally have the effect of placing co-partners in a position to make further purchases of the Company's stock, of which no less than £11,109 is now held either by co-partners themselves or by the co-partner trustees.

We believe that the continued happy relationship which has existed for so long between the Company's employees and the management, is very largely due to the existence of the Co-Partnership Scheme, and the co-operative spirit which it engenders. It is to you, as co-partners, that I appeal to-night to do your utmost to foster and promote the welfare of the Company. At the risk of repeating what has been said at previous meetings, emphasis must be placed upon the vital necessity of everyone doing his utmost to encourage the use and sale of the commodities we have to offer.

Mr. W. Pearce (coal tipper, Morriston Works, and member of Committee) seconded the adoption of the report, and was supported by remarks from Mr. C. H. J. Collins (Chief District Inspector) and Mr. F. J. Coates (Stoker). The proposition was then put to the meeting and carried unanimously.

There followed discussions on various matters relative to the Company's business. Throughout the evening there was ample evidence of the existence of a true spirit of co-partnership among the very large number of employees present.

British Chemical Standardization.

Details of Council Membership.

The inaugural meeting of the Provisional Council for the Chemical Division of the proposed new Standards Association of Great Britain, which was held on May 7 at the offices of the Association of British Chemical Manufacturers, marks the successful completion of the negotiations which were initiated nearly a year ago. In June, 1930, a large and representative conference of chemical interests, convened by the Association of British Chemical Manufacturers, unanimously resolved that a British Chemical Standardizing Body should be constituted which would co-ordinate and accelerate the work of standardization in the chemical field, and do for chemistry what the British Engineering Standards Association has done, and is doing, so successfully for engineering. The conference also agreed that, in the interests of efficiency and economy, there should be a single national organization embracing all forms of standardization, and that an *ad hoc* Committee should be formed to explore the situation as regards chemical standardization in collaboration with the British Engineering Standards Association. A representative Committee was formed under the Chairmanship of Dr. E. F. Armstrong, the Chairman of the Association of British Chemical Manufacturers, with Mr. J. Davidson Pratt, the General Manager, as Secretary, and set to work at once to devise a scheme which would permit of the incorporation of chemical standardization with the British Engineering Standards Association in a new Standards Organization designed to meet the needs of industry as a whole. The points which the Committee regarded as of fundamental importance were that the chemical interests should be on an equal footing with those of engineering, and that the new organization should possess the flexibility necessary to enable any desired standardization to be carried out efficiently and expeditiously.

The title for the new organization presented some difficulty, and it was finally agreed that the title "Standards Association of Great Britain" met all requirements and was free from objections on the part of other industrial organizations. As the controlling body there will be a General Council to deal with matters of broad policy and general interest, this will be constituted essentially by the election of nine members from each of the Divisions and by the nomination of a representative each of the Board of Trade, the Department of Scientific and Industrial Research, the Federation of British Industries, the Association of British Chambers of Commerce, and the Institution of Civil Engineers, on behalf of the founders of standardization. There will be four co-equal main Divisions, each controlled by a Divisional Council, for Engineering, Chemistry, Building, and Textiles. Each of these Divisions will be autonomous subject to the broad policy laid down by the General Council, and will be free to organize itself in the manner which it finds most suitable for carrying out efficiently and expeditiously the objects of standardization within its particular field.

The Engineering Division will consist of the present British Engineering Standards Association, with the exception of those elements which will now find a more appropriate place under one of the other Divisions. The new scheme is broad in its conception and simple in constitution, and meets all the requirements of the chemical interests. It has been unanimously accepted not only by all the chemical organizations which participated in the initial conference, but also by practically every other body likely to have a direct interest in the work of chemical standardization. Active steps are now being taken by the British Engineering Standards Association to obtain the necessary Supplemental Charter to give effect to the new organization, while the new By-Laws are already in final form.

At the inaugural meeting of the Provisional Council of the Chemical Division on May 7, it was decided that the membership of the Chemical Council should not exceed 40, and that not more than five of these places should be reserved for the co-option of individuals whose services are likely to be of special assistance to the Council. The constitution of the Council includes the Association of Tar Distillers, the Chemical Society, the Institute of Chemistry, the Institute of Fuel, the National Benzole Association, the Institution of Chemical Engineers, the Society of Chemical Industry, the Institution of Gas Engineers, and the National Gas Council. Each of these organizations will nominate one representative. Dr. E. F. Armstrong has been elected as Chairman, and Mr. W. Rintoul as Vice-Chairman.

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman

Service in a New Direction.

It is a well-known fact that those who can least afford it are frequently the victims of their own ignorance in the buying of the right foodstuffs and the cooking of them to the best advantage. In the poorer quarters of many cities the innocent waste and extravagance in this direction are often very serious. The Maternity and Child Welfare Medical Officer for Newcastle-on-Tyne has sought the co-operation of the Gas Company in their effort to combat the unfortunate state of affairs, and the Company have readily agreed to help in what constitutes a new direction of service to the public.

Invitations have been issued to attend the first of a series of afternoon free demonstrations in cookery, at the first of which one of the Company's Lady Demonstrators will deal with "Cooking for a Growing Family." She will show how cheap, wholesome, palatable, and body-building foods can be cooked in the most appetising way. She will explain how best in every way to get the utmost value out of every penny spent on foodstuffs, how indifferent buying of foodstuffs means waste of money, and how it reflects on the health and well-being of the family. It is hoped to hold these demonstrations weekly. No charge is incurred by the City, as services, &c., are entirely free.

Those Complaints.

Much has been said and written lately on this subject. Gas salesmen have been urged to glory in "complaints" and to welcome them as golden opportunities for service, and speakers at discussions have taken credit for having dealt with so and so many in a year. We all know what is meant. But "complaint" in everyday life is an ugly word, and to the initiated public and the gas undertaking employee who is not perhaps a great thinker a complaint simply must imply something wrong, and the existence of a Complaints Department that something is *expected* to be wrong. The Brighton and Hove General Gas Company seem to have struck a very good note in the following extract from a review of 1930 in a recent issue of their Co-Partnership Magazine. "We believe that we rendered . . . service in 1930, dealing promptly with orders, carefully sifting and correcting the few complaints of inefficient service brought to our notice, learning our lesson, and avoiding as far as possible similar pitfalls for the future. We know that notifications of escapes of gas, requests for adjustment of appliances, or correction of defects in service connections, and the hundred and one little things that we used to term 'Complaints'—a miserable sounding word savouring of disgruntled customers, and recognized to be an out-of-date misnomer for which we have substituted 'Gas Supply Inquiries'—have had more prompt attention than ever before."

Products of Combustion.

"I must now turn to carbon monoxide, that special delight of a certain section of the scare-mongering press. It is present in town gas to the extent of 10 to 15 p.ct. It is formed in small quantities whenever carbon-containing fuels are burned. Motor car exhaust gases may contain 10 p.ct. of this gas, and may be the cause of fatalities in garages and of sickness in confined places. The air of our towns normally contains 3 to 5 parts per million of CO, while in busy traffic centres this may rise to 50 or more parts per million in the air we breathe. This is a far greater proportion of CO than will be found in the products of combustion from many of our gas appliances, when in good working order. It is quite a common occurrence to find flue gases from gas appliances with a smaller CO content than that of the incoming air."

This is a quotation from a paper by Mr. James W. Wood, M.Sc.(Tech.), A.I.C., on Gas Appliances and their Products of Combustion, in which the Research Chemist to the Joint Research Committee has rendered signal service to all gas salesmen. The full text is now on record in the May "Gas Salesman," where it will no doubt be referred to again and again. A mass of useful information is condensed in the paper without going into intricate detail or too many reasons how and why, and it is easy to understand by those who do not possess great technical knowledge. Altogether an excellent Circle paper.

When the Town Goes Racing.

There are from time to time in most places events—not always intimately connected with business—which distract the local mind temporarily from everyday humdrum affairs, and which, for a few days or perhaps a week, are the "talk of the Town." On such occasions an ordinary window display may receive less attention than usual. On the other hand, the resourceful display man will welcome it as a golden opportunity to attract far more than ordinary attention to his window. This is the theme of Mr. Easten Lee's display article in the May "Gas Salesman," and he describes a lay-out which met with success at the time of a local race meeting. With a little thought most local "great events" can be turned to account in this way, and the resulting publicity is always well worth the little thought. Some of the lines of Mr. Lee's amusing cards may be suggestive to others.

If GEYSER runs for the Bath Handicap it is sure to be a hot one.
For a steak on the "Plate"—
GAS COOKER is a certainty for this.
Don't forget that GAS FIRE will always be a warm favourite.
Another thing to remember—
WASHBOILER always gets a "flying start."
Be on a good thing—GAS IRON an "easy runner" and very "speedy."
Have a "saver" on GAS POKER, a "sure starter."
SCUTTLE, FIRE-IRON, and DIRTY WORK are old "handicappers" and have had their day.
There is no need to go in for the Sweep if you take these tips.

Gas is Cheaper and Quicker.

Comparative costs are always useful, and an admirably clear table has recently been published in pamphlet form by the Gloucester Gas Light Company.

The figures are based on gas at 8d. a therm and electricity at 1d. a unit, but for electricity the fixed annual charge of 2s. 6d. in the £ on rateable value is *extra to the figures below.*

	Gas.	Electricity.
ROOM WARMING.		
The heat of a room 12′ × 12′ × 10′ would be maintained at a comfortable temperature at a cost of .	$\frac{4}{5}$d. per hour	2d. per hour
COOKING.		
A meal can be cooked for 4 people at a cost of . .	$1\frac{2}{5}$d.	$2\frac{11}{12}$d.
WATER HEATING.		
Four baths daily, and for the usual hot water required for domestic purposes (say 66 gallons) costs . .	$8\frac{4}{5}$d.	2s. 1d.
BOILING WATER.		
A 4-pint kettle of water can be boiled at a cost of (an electric hotplate being used)	$\frac{1}{4}$d.	$\frac{3}{4}$d.
IRONING.		
4 hours continuous ironing can be done at a cost of	$\frac{2}{3}$d.	1d.
REFRIGERATION.		
A refrigerator can be run for 24 hours at a cost of .	$2\frac{1}{5}$d.	$5\frac{1}{2}$d.
LIGHTING.		
35 hours lighting would cost	$8\frac{2}{5}$d.	1s. $4\frac{3}{4}$d.

(based on two 60-watt lamps—GAS giving equal candle power. In this instance an average cost of 4d. per unit is taken which includes the Annual Charge).

ROOM WARMING.
ONE SHILLING will maintain the heat of a room 12′ × 12′ × 10′ for 6 hours using Electricity
BUT . . . . . 15 „ „ GAS

COOKING.
ONE SHILLING will cook a meal for 16 people . . . using Electricity
BUT . . . . . 34 „ . . . „ GAS

WATER HEATING.
ONE SHILLING will heat 33 gallons of water for baths, &c. using Electricity
BUT . 90 „ „ „ „ GAS

BOILING WATER.
ONE SHILLING will boil 64 pints of water on a hotplate using Electricity
BUT 192 „ „ „ „ GAS

IRONING.
ONE SHILLING will give continuous ironing for 48 hours using Electricity
BUT . . . . . 72 „ „ GAS

REFRIGERATION.
ONE SHILLING will operate a refrigerator for 50 hours . using Electricity
BUT . . . . . 125 „ „ GAS

LIGHTING.
ONE SHILLING will light a room (two 60-watt lamps) for 25 hours using Electricity
BUT 50 hours (equal to two 60-watt lamps) „ GAS
(In this instance an average cost of 4d. per unit is taken which includes the Annual Charge).

Influence of the Size of Coal Used in Gas Practice

An Article on the importance of the Petrographic Composition of Coal

By G. E. Foxwell, D.Sc., F.Inst.P., F.Inst.F.

The sizing of solid fuel which, applied to coke, has recently become so important a feature of gas-works practice, has been the custom at collieries for a great many years; and most colliery companies offer their coals sized into smalls, singles, doubles, trebles, and so forth. The particular variety of coal generally used for gas-making may be either screened or unscreened; for the purpose of the article it is considered that the difference between the two is essentially that the unscreened coal contains both the nuts and larger coal and the slack, while in the screened coal the slack is removed. The size of coal purchased for gas-making generally depends upon the type of retort available, but there is a disposition when considering the erection of new retorts to fit the retort to the class of coals that it is desired to purchase, rather than to select a retort and purchase coal accordingly.

The selection of a carbonizing plant depends upon capital and operating costs of verticals and horizontals respectively, together with the difference between the gas-making results and carbonizing qualities of the classes of coals commonly used in these two types of retort.

The difference in cost between the several sizes of coal is marked. A recent quotation for gas coal, for example, showed that the price of screened coal is 30 p.ct. greater than the price of the unscreened coal. This difference in price does not represent the cost of screening, but it is necessitated because of the greater demand for the large sizes of the screened coal and the difficulty of disposing of the fines. The fines, wherever possible, are disposed of by carbonization in the coke oven at a price of about 10s. per ton. The opinion is frequently heard among gas engineers that the coke ovens are unduly favoured by the price at which coal is charged to them, but the explanation lies in the fact that coke ovens use a grade of coal which many gas-works reject. The carriage on the coal is also an important factor in the increased costs to gas-works, but this is compensated by the fact that, if the coke ovens desire to sell gas coke in competition with the gas-works, they must bear the cost of transporting the coke.

A similar discrepancy in value is to be found in the other sizes of coal. If the price of washed smalls, for example, is taken as unity, the price of singles is 1·25—*i.e.*, 25 p.ct. greater—the price of doubles 1·4 (40 p.ct. greater), and the price of trebles 1·6 (60 p.ct. greater). It is evident that the size of the coal in relation to the cost of making gas from it is of extreme importance, and gas managers must be fully conversant with any difference which the size of coal used may have upon the operation of gas making; and they must also be conversant with modern work upon the preparation of coal for carbonization. In this work, sizing is considered of particular importance.

Banded Constituents.

Probably the most important classification of coal that has yet been made from a practical point of view is that into the banded constituents which was made by Dr. Marie Stopes. Everyone acquainted with coal must early have recognized dull coal and bright coal; the fusain frequently termed " mother of coal " was also known from quite early times. Dr. Stopes drew attention to four varieties—fusain, the fibrous " mother of coal; " durain, which constitutes the dull coal; vitrain, which constitutes the pure bright coal; and clarain, which is optically apparently composed of bands of durain and clarain so closely intergrown as to be inseparable by ordinary physical methods. Actually durain contains a constituent which is not found in clarain or vitrain, and, therefore, clarain cannot actually be considered as a mixture of durain and vitrain.

At the time when the classification was made, it would not appear to have any practical significance; but as is so often the case with the concepts of pure science, a practical application of this work followed in due course. This practical application is not yet firmly established because there has, as yet, been insufficient opportunity to apply it to a large number of coals. Certain generalizations, however, are gradually emerging.

The first of these generalizations is that the material which most readily breaks down into powder is fusain. When coal is washed, the slurry consists of particles so fine that for the most part they follow Stokes' law of settling, and, consequently, under the conditions of practical operation of a wet washer, they remain suspended in the water. The slurry, as it is termed, does not consist wholly of fusain, but also contains small particles of the other constituents of the coal; it is, however, a fact that fusain is highly concentrated in the slurry. The fusain content of a coal is generally of the order of 3 p.ct.-5 p.ct.; but the fusain content of the slurry is frequently as high as 20 p.ct. If the material which would normally form the slurry—that is to say, the material passing through 20 I.M.M. mesh—is again sized, it is found that the fusain is increasingly concentrated in the smallest material, so that the material passing through a 200 sieve may contain fusain in an almost pure state. It is recorded, for example, by Mott and Wheeler (" Coke for Blast Furnaces," p. 189) that whereas the material from a certain coal passing through a 20 I.M.M. mesh and retained on a 60 mesh contained only 3·5 p.ct. of fusain, the material between 100 and 200 mesh contained 50 p.ct. of fusain, and the material between 200 and 300 mesh contained 70 p.ct. of fusain.

The distribution of fusain has been dealt with at some length for two reasons. First, because fusain is not usually a good gas-making material as concerns yield of gas, compared with other constituents of coal. Further reference will be made to this later. Secondly, because recent work, particularly that of the Midland Coke Research Committee, has shown that fusain has in many instances a very marked influence upon the quality of the coke produced. The time is undoubtedly approaching when gas-works will not select their coals simply because of their gas-making qualities, but will also pay attention to the character of the coke. Even now some gas managers select their coals on the principle that while producing gas economically, they will also yield an open textured coke satisfactory to their consumers. The time will probably come before long when the production of a good quality of coke will be considered equally as important as the production of the proper quality of gas.

Uniform Admixture of Fusain.

Since modern research has shown that the fusain which in itself is entirely non-coking, but which has a profound influence on the behaviour of the other constituents, is concentrated in the finest material, it follows that if screened gas coal is purchased, and there is consequently comparatively little fusain in the coal charged into the retorts any beneficial effect of fusain will be lost. Uniform admixture of fusain with coking coal results in an increased hardness of coke and generally in an improvement in many other directions, notably in size. If a coke is being produced which contains too much breeze, the use of fusain, properly mixed, acts as a corrective. The importance of producing as little breeze possible in the retorts is evident in view of the general adoption of coke cutting machinery. So much breeze is produced from the operation of these machines that the breeze produced during carbonization must be kept down to a minimum. Moreover, the production of a hard coke minimizes the production of breeze produced in the cutters.

Research has also shown that, in general, the durain is a good deal harder than the clarain and vitrain—that is to say, the dull coal is harder than the bright coal. It may not always be correct to include clarain in this generalization, because clarain is a very ill-defined constituent of coal. The composition of clarain is such that it may be so bright as to merge into vitrain, or so dull as to merge imperceptibly into durain. It is not impossible that a fine laminated structure such as that of clarain may in certain circumstances be a cause of weakness and in other circumstances a cause of strength, so that there is some doubt at present in the minds of fuel technologists as to whether clarain is always softer than durain, or whether it may sometimes be harder. There are a great many coals, however, and among these are most gas coals, in which there is very little doubt that the bright coal is considerably softer than the dull coal. This is also a factor of practical importance. If a purchaser buys slack, he may probably buy material which is rich or relatively rich in bright coal, whereas when he buys nuts, he buys a material which frequently consists very largely of dull coal. The recognition of this important difference is recent. It is only a matter of three or four years ago since an owner of large collieries known personally to the writer refused to believe that there

could be any difference in the composition of slack and nuts, his argument being that since both came from the breaking down of the large coal, both must be exactly similar in composition. The trend of recent research, however, is to lay stress upon the differences in petrographic composition that exist between the various sizes of coal.

Coals are to be found which consist principally of dull coal or principally of bright coal, so that apparently the nuts and the slack are of approximately the same composition; but in most coals, dull and bright laminæ alternate in the seam, and a separation occurs according to the relative hardness of the constituents during the processes of coal mining and preparation.

The practical significance of this separation lies in the facts that durain contains large quantities of plant remains which yield much oil on carbonization, and that it possesses such moderate coking properties that in this respect it is far inferior to vitrain. It must not be inferred from this that a sample consisting wholly of bright coal will make excellent coke, whereas a sample consisting wholly of dull coal will never make presentable coke. Many durains possess quite appreciable coking properties, but the coke which even these specimens yield, if unmixed with other banded constituents, noticeably vitrain, is generally hard and dense and so far as the writer's experience goes, is frequently only combustible with extreme difficulty. On the other hand, the durain obtained from the Leicestershire non-coking coals generally yields a coke which is highly reactive. It is well-known that a very reactive coke can be made from a mixture of coking and non-coking coals, and the carbonization of such mixtures has been patented. There is ground for believing that the oils which are obtained from the plant remains in durain play an essential part in coke formation, so that a proportion of durain is advantageous and even, on this view, necessary in practice. The vitrain from a Leicestershire coal possesses quite good coking properties so that the non-coking character of these coals is probably derived from the preponderance of durain. This remark, however, is subject to the one reservation that it is not yet known with certainty whether or not the vitrains from all classes of coal possess equally strong coking powers.

Behaviour of Vitrain.

Durain, according to our present conclusions, behaves in a widely different manner according to the character of the coal from which it is obtained. Vitrain, on the other hand, as just mentioned, does not, so far as our present knowledge goes, appear to exhibit these marked differences in behaviour. Upon carbonization, vitrain swells very greatly and it appears to contain a super-abundance of the swelling constituent of coal the decomposition of which enables a coal to make a co-herent coke. It is, therefore, seen that the practice of buying nuts for vertical retorts is sound, not only because the larger size of the nuts gives a greater opportunity for the gas to escape, but also because the nutty coal swells less than does the slack. In the same way, it will also be clear that the practice of carbonizing promiscuously unscreened gas coal is not calculated to produce a uniform quality of coke, nor a low proportion of breeze.

The use of a non-homogeneous mixture of coals for carbonization also affects the working of the retorts. Uniform operation of the retorts is a matter of considerable importance. The combustion chamber in a horizontal retort is, in theory at any rate, kept at a definite constant temperature, and, after a pre-determined time, the retort is assumed to be ready for discharging. The discharging machine thereupon pushes out the coke from each of the retorts in its proper order, regardless as to whether the gas has been completely expelled from the coke or not. If a combustible coke is desired, the retorts would be pushed a little green. Under present conditions, however, gas-works cannot afford to take up the attitude that they will sell combustible coke at the expense of losing therms in the gas. Consequently, the present practice is to burn off the coke as completely as possible and to rely wholly upon an open porous structure for the production of coke possessing the requisite combustible properties.

The importance of making a uniform mixture of coal for carbonization lies in the behaviour of the coal when heated. When a relatively non-coking material is carbonized so that the plastic layer has a low resistance to the passage of gases, the products evolved can escape quite readily, and it is found in practice that carbonization is completed more rapidly than when the plastic layer is of a very sticky character. In the latter instance, the plastic layer offers a very high resistance to the passage of gases, and it is found in practice that the carbonization is retarded. A practical instance of this is in the practice of mixing coke breeze or non-coking coal with the coal which is charged into the coke oven. At bye-product coking plants at which this has been tried on a large scale, it has been found that the carbonization can be speeded up to the extent of 20 p.ct. by these means. Claims have also been made recently for another process in which the carbonization is also similarly speeded up by withdrawing gases through pipes situated in the cool interior of the charge. The carbonization of a mixture consisting of fine coal and nut coal may, therefore, cause the completion of coking throughout the length of the horizontal retort to lack uniformity. Where there is a local concentration of the nuts, the carbonization will be completed readily, while where the slack preponderates the carbonization will take longer to complete. The result is either that fuel is wasted in overheating the coke in one portion of the retort, or, which is probably more important, that patches of the charge in the retort are not completely carbonized. There is the further disadvantage that the quantity of breeze produced by carbonization of a non-uniform mixture is greater than that produced when the mixture is uniform. Arguing, therefore, from the basis of known modern developments in the preparation of coal, there is certainly sufficient justification for research into the advisability of careful preparation and mixing of the coal charged into horizontal retorts. Parenthetically, it may be remarked that research upon coal used in vertical retorts would only be necessary were a proportion of fines to be carbonized with the nuts, and in this case it is even more important for the slack and the nuts to be mixed in carefully graded proportions. Proper mixing would probably demonstrate the possibility of using a proportion of slack coal in any verticals. Most users of vertical retorts could thus cheapen the cost of coal.

Mixing for Carbonization.

The mixing of coals for carbonization in horizontal retorts would consist of a division of the material into three sizes—namely, dust, slack, and nuts. Generally speaking, it is not necessary or advisable in gas-works practice to crush the coal before coking in any gas retort, and it would, therefore, not be essential to crush the nuts, although undoubtedly crushing would facilitate preparation of a uniform charge. The three materials after separation would then be re-mixed on a belt in the proper proportions. The expense of this practice might very well be recovered in the decreased quantity of breeze produced and in the decreased carbonizing time, whereby the capital charges per unit of gas made would be appreciably reduced. The net cost into holder is, after all, a misleading figure, because, as all acquainted with works costing will recognize, capital charges, depreciation *et id genus omne* are the greatest single cost in most carbonization processes, excepting, of course, the prime material, coal.

The mixing of coals in gas-works offers also a further important advantage—namely, that of mixing a proportion of non-coking coal with the coking coal in order to produce a coke which shall be physically much better for the domestic user than the present gas coke. It is a reflection upon gas coke that low-temperature fuel such as " Coalite " sells readily for so much higher a price than gas coke. In April, for example, a large London stores advertised that for quantities of not less than half a ton, they would supply " Coalite " for 55s. per ton, whereas broken gas coke was supplied at 41s. 8d. per ton. This fact in itself is sufficient to demonstrate that gas coke is not regarded by the public as an ideal fuel and that there is an obvious need and an opportunity for improvement. A non-coking coal has one disadvantage from a gas-making point of view—namely, that a more considerable proportion of its volatile matter than usual is given off in the form of water of distillation; but generally the gaseous therm yield from a high volatile coal possessing only poor coking properties is not markedly different from the yield from a good coking coal, so that there is at any rate the possibility of greatly improving the quality of gas coke without in any way affecting the therm yield.

The importance of the petrographic composition of coal has so far been considered from the point of view of sizing and uniformity of carbonization and from its influence upon the quality of the coke. There yet remains a discussion upon the gas-making properties of the four banded constituents.

Gas-Making Properties.

The gas-making properties are also important for any consideration of the effect of size of coal used on the carbonizing results. The several sizes of coal will not have the same composition, and the relative amounts of the banded constituents which the several sizes contain may exert an influence upon the result. The effect on the process of gas production of the size of the coal carbonized in a retort may be expected to depend upon two factors:

(1) The relative proportions of the petrographic constituents which are present in each of the sizes.
(2) The relative ease with which gas escapes from coals of the several sizes.

Work upon the last-named problem has been published

by the Research Sub-Committee of the Gas Investigation Committee of the Institution of Gas Engineers and by the Fuel Research Board. In the Institution of Gas Engineers' experiments it is difficult to determine to what extent the possible effect of the banded constituents had been taken into account. The report states that the "coal was graded in four sizes, 1¼ in.-¾ in., ½ in.-¾ in., 10-30 mesh, and through 30 mesh, in such a manner that the compositions of the four grades determined by analysis were practically the same." It is, however, a matter of extreme difficulty and probably of impossibility to grade coal into sizes in this way without altering its petrographic composition. If, for example, large coal is broken down and subsequently screened into the four sizes mentioned, the petrographic composition of the material will certainly not be the same in each of the sizes, and the same difficulty applies if the experimentalist starts with coal of (say) 1¼ in.-¾ in. in size and endeavours to break portions of this down to each of the required sizes. The largest size and the smallest can, indeed, be made to possess the same petrographic composition, but the two intermediate sizes must suffer from the preferential crushing of the softer material.

These experiments showed that the calorific value of the gas is practically constant whatever the size of coal used within the limits of their test, but that the yield of gas and other products varies as follows:

—	1¼ In.-¾ In.	½ In.-¾ In.	10-30 Mesh.
Gas made per ton, c.ft.	11,270	11,980	11,880
Therms per ton	67·3	71·1	70·4
*Tar, galls. per ton	10·8	8·6	7·6
S/A, lbs. per ton	25·1	26·6	25·1

*Note that the largest material will contain the most durain; durain is essentially a tar-yielding constituent.

It was found as a general conclusion that in the early stages of carbonizing—that is to say, when the influence of the plastic layer would be at its maximum—the rates of gas production were greater with the larger size of coal than with the smaller sizes, but that these differences became less as the carbonization advanced, and ultimately that the position was reversed, with the result that when carbonization had been completed the total volume of gas obtained was approximately the same in all instances. The therm yield, however, was not constant, there being a difference of 4 therms between the largest material and that next in size. The 1¼ in. to ¾ in. coal would be richest in durain and the 10-30 mesh in fusain. This explains the variation in therm yield—*cf.* Greenwood's results given later.

Another similar set of experiments was made at the Fuel Research Station and published in their technical paper No. 26. In this series of tests, the washed nuts received, which consisted of anything up to 2½ in. in size, were screened over ¾ in. screen and the fine coal rejected. The screened coal thus obtained constituted the largest size carbonized. To prepare the second size of the coal, referred to as "medium," the large material so obtained was crushed to pass the ¾ in. screen, "care being taken to prevent the formation of an excessive amount of fine coal." The smallest size of coal was prepared by crushing the largest material to pass a ⅜ in. screen. In this case, the largest and the smallest sizes of the coal may be taken as being petrographically alike, but the intermediate size was probably relatively too high in durain to be considered as similar to the other coals. This series of experiments, however, is undoubtedly the closest that has yet been made towards obtaining definite information concerning the influence of size in allowing the ready escape of the gases. The yield of gas by volume in steamed vertical retorts increased by the use of large coal, but in horizontal retorts the finest material was found to be preferable. The increased volume of gas in vertical retorts when using large coal became more marked as the caking power of the coal increased, as would be expected. Naturally, also, the increased volume was obtained at the cost of a decreased calorific value. It was further found that by the use of sized coals, it was possible to increase the throughput of the vertical retorts fairly considerably; but there did not appear to be very much alteration in the rate of operation of horizontal retorts when using coals of various sizes. Generally speaking, it was found that in a horizontal retort the effect of size of the particles was small, whereas in a vertical retort, the different yields from the various sizes of coal was marked. The results, however, are likely to be different when unscreened coal not carefully mixed is used because the density of the coal charge [lbs. per c.ft.] would vary from place to place in the retort, and this would prevent uniform carbonization.

Banded Constituents and Gas Yield.

The behaviour of the banded constituents of coal in relation to their yield of gas and products is important when the question of purchasing coal of any given size is under consideration. The first published series of experiments was that made by Dr. Lessing (Trans. Chem. Soc., 1920, Vol. 117, pp. 247-256) in which the materials were carbonized in his well-known laboratory coking apparatus. The results appear to show that fusain gave a higher gas yield than any of the other constituents of coal, but this observation probably is only valid for the particular coal examined by Dr. Lessing, because fusain from coking coals usually only contains about half the quantity of volatile matter that is contained in the other constituents. Generally speaking, the clarain and vitrain were found to yield very similar quantities of gas, while the durain yielded slightly less. The gas volume figures obtained by Dr. Lessing, however, are much lower than the quantities which would be obtained in practice.

Figures have also been published by H. D. Greenwood (J.Soc.Chem.Ind., 1924, Dec. 26) which show that the yield of products obtained from the banded constituents of a Derbyshire coal are as follows:

Sample.	Coke.	Tar.	Liquor.	Gas.
	P.Ct.	P.Ct.	P.Ct.	C.Ft. per Ton.
Vitrain	65·7	7·7	8·0	12,200
Clarain	65·4	8·9	7·5	11,900
Durain	62·3	12·1	5·9	11,600
Fusain	80·3	3·6	4·8	8,500
Coal, true sample	66·8	8·9	7·5	10,900

The analyses of the gases obtained is as follows:—

—	Coal, True Sample.	Fusain.	Durain.	Clarain.	Vitrain.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.
H_2S and CO_2	2·7	2·6	1·9	2·0	1·9
O_2	1·2	1·2	1·4	1·3	1·3
C_nH_m	3·8	2·9	3·9	4·0	3·9
CO	7·0	8·2	6·8	6·4	6·3
H_2	49·0	60·6	47·7	49·0	49·5
CH_4	27·7	16·5	26·3	28·5	29·0
N_2	8·6	8·0	9·0	8·8	8·1
C.V. of gas, B.Th.U. per c.ft.	544	552	527	554	560
Yield, therms per ton	59·3	46·9	61·2	64·8	68·3

These results show that vitrain is superior to clarain and durain as a gas-making constituent, and that clarain is to be preferred to durain. Fusain is of low value. The results of the Institution of Gas Engineers' work previously mentioned show that the largest size of coal yields the smallest quantity of therms per ton, and this confirms Mr. Greenwood's results. From the point of view of gas manufacture, therefore, bright coal must be considered preferable to dull coal, and slack is to be preferred to nuts for horizontal retorts. For vertical retorts, considerations other than purely gas-making properties apply.

Fusain, as has been mentioned previously, is concentrated in the finest dust and from a purely gas-making point of view this material should be avoided. It has been pointed out previously, however, that a proportion of fusain properly added may be of great importance in reducing the quantity of breeze. The amount of fusain so required is very small and would not noticeably affect the gas production. A coal yielding 70 therms per ton if mixed with 5 p.ct. of fusain yielding 50 therms per ton would still give a total gas yield of 69 therms per ton. Probably it will be worth while losing a therm per ton in order to reduce the proportion of breeze manufactured.

NEW PRODUCTS AND - - NEW MARKETS - -

The author of this article puts forward a tentative scheme in an attempt to encourage closer co-operation between science, coal producers, gas interests, and low-temperature carbonization

By HARALD NIELSEN.

In my article in the last issue of the "JOURNAL" I attempted to indicate briefly on what lines I considered low-temperature carbonization or distillation plants could be linked up to gas-works for the purpose of:

1. Consuming more coal;
2. Assisting the coal industry in making coal the basis for a home supply of oil;
3. Producing a new standard fuel; and
4. Smoke abatement on economical lines.

I did not, in my article, have any specific low-temperature process in mind, since I fully realize that there is room for several processes, as long as they are technically and mechanically sound. Varying coals and conditions will undoubtedly require different processes, but this fact does not in any way alter the general outlook. What we have to concentrate on is the creation of a new and profitable home market for coal, for the ultimate purpose of cheapening the export grades and recovering lost markets by producing an article for which a demand exists abroad as well as at home.

In the electrical industry we have seen that, thanks to new developments, great economies in fuel consumption have been achieved, so that, although more and more electricity is being used, the quantity of coal consumed has not increased *pro rata*. Low-temperature plants will, I hope, eventually be linked up to electricity undertakings; but in view of the fact that an electricity undertaking is mainly interested in getting the cheapest possible therm in the form of steam generated from coal, the position here is somewhat different. In other words, from a combustion point of view, a heat unit, be it in the form of raw coal, coke, gas, or oil, will only produce a given amount of steam, depending on the efficiency of the boiler plant. But the slight differences in efficiency which may be obtained in a modern generating plant, whether using solid, liquid, or gaseous fuel, are so small that we can leave them outside the scope of our considerations.

In the Gas Industry the position is very much different. As I said in my previous article, the Gas Industry has for its object the separation of raw coal into the various heat units in solid, liquid, and gaseous form, and the disposal of these various heat units in markets where the best possible price can be obtained, consonant with their availability. The Gas Industry has in the past considered the manufacture of gas its main purpose; coke and tar were looked upon as of subsidiary importance. To-day, the position is altered. Gas is still, of course, the primary product, but the priority in importance given to the gas at the expense of the other two products is being levelled down, and gas undertakings are being called upon to a far greater extent to supply the community with a satisfactory solid fuel, which is suitable not only for stove purposes, but also for the ordinary domestic grate, and they are paying more and more attention to the potentialities of low-temperature carbonization in the production of a free-burning, easily ignitible solid fuel. We also see that the high-temperature carbonization has been modified, and the blending of various grades of coal is resorted to in order to make the coke more suitable to meet these new demands. It is being realized that the consumer of solid fuel is not content any longer to take what the gas-works wish to dispose of, but wants the gas-works to supply him with just what is suitable for his purpose. I will take a leaf out of the Prince of Wales's speech at Manchester, when he said that we must supply the article our customers want and not attempt to impose our will on the customers, because, after all, we live on our customers, and their desire to buy is what we have to cultivate.

MAKING COKE TO SPECIFICATION.

We know that to-day, although great progress has admittedly been made in the quality of coke, and its range of availability has been considerably extended, coke as such is not yet everything that can be desired. We must guard against the tendency which undoubtedly exists of mixing a good grade coke with a somewhat inferior grade, thereby causing dissatisfaction; and this we can only do by making an article which is more or less in the form of a proprietary product, which cannot be juggled with. Its shape and form and the standard specification to which it is produced should be the guarantee to the customer that when he orders that particular fuel or coke he gets exactly what he wants, and thereby becomes a satisfied customer.

Along these lines it is possible, in my opinion, for low-temperature carbonization to assist the Gas Industry. There are several other considerations to which I shall refer shortly. Our goal must be to produce and sell a standard fuel of uniform excellence and to a standard specification. It must be an article which will stand transport well and contain a minimum of dust and moisture and ash. It must be readily ignitible and must have a bulk density which is greater than ordinary gas coke.

As a smokeless fuel anthracite is excellent. It is heavy; it is—or, rather, should be—clean; and in a given volume we have a considerable number of British Thermal Units available. But its price is high. High-grade coke may, pound for pound, have a calorific value approaching that of anthracite, but it is bulky, and to offer the same general facilities as anthracite it should be dense. Generally, gas-works coke as supplied to the householder has a bulk density of approximately 90 to 100 c.ft. to the ton; anthracite, about 40 c.ft. to the ton. The difference in bulk density is too great. The bulk density of coke can be improved by uniformity of size and greater density of the individual pieces. We shall discuss this later.

Furthermore, the householder complains that in ordinary gas-works coke, even when it is used in an improved type of deep open fire, there is a considerable amount of unburnt coke left in the ash. From my own experience, I have come to the conclusion that even with a good grade gas coke 70 to 75 p.ct. only is combusted. From this point of view alone there is considerable room for improvement in gas coke. With the new fuel, observed figures indicate that a combustion efficiency—if one can use that term—of the order of 85 to 90 p.ct. is obtained; thus the customer gets more useful heat out of the new fuel.

STARTING WITH A PRIMARY OIL.

We now know what we are up against as far as solid fuel is concerned. By the combined low-temperature and high-temperature scheme outlined in my first article, as I said, coal should be subjected to low-temperature treatment for the removal of the oil, and in doing this we shall obtain a rich gas which is eminently suitable for carburetting the low-grade gas to the declared value, thereby eliminating the import of gas oil, which is, after all, only an unprofitable makeshift. We get on an average 20 gallons of low-temperature oil per ton of coal, from which can be extracted a fuel or Diesel oil suitable for naval and general marine purposes. Furthermore, with vacuum distillation and in the presence of steam, by carrying the distillation to the pitch-coke state, we get high-boiling viscous oils from which, if we start with a primary oil—that is, an oil which has been decomposed as little as possible in the retort—we can obtain lubricating fractions which can take the place of imported well oil lubricants. As far back as June, 1926, I drew attention to this fact in the "GAS JOURNAL."

As a result of the low-temperature carbonization we shall obtain a solid residue, in which we shall leave the highest possible percentage of volatile or gaseous matter, consistent with complete oil extraction. By crushing this residue and briquetting it with pitch, we obtain an excellent hard and dense briquette, which when subsequently carbonized in any standard gas retort, preferably of the vertical type, will give a suitable town gas of a calorific value of just over 400 B.Th.U. per c.ft.; and this gas, when mixed with the low-temperature gas obtained in the first stage, will give a town gas ready for use. At the same time we obtain a uniform, dense, ovoid coke briquette, which will pack closely and be of a shape to resist disintegration in transport and handling very much more than does irregular, pointed, and flaky coke.

By using a graded material in the high-temperature retorts we can obtain considerably bigger throughputs. This has been proved out by the good work done, not only by the Institution of Gas Engineers, but also by H.M. Fuel Research Board, so that, although the gas volume obtained per ton of pitch briquettes may be 15 to 20 p.ct. less by weight of charge, the carbonizing time is shortened, and we obtain per diem the same gas producing capacity

with the high-temperature setting as when using raw coal. In addition, we are able to control the moisture and the ash content in the coke briquettes, and we can produce a standard, uniform briquette to a strict specification, practically irrespective of the character of the raw coal, be it coking, medium coking, or non-coking, since the binding properties or coking propensities on which we have to rely are not the unknown factor in the raw coal, but the definitely known properties of the added pitch, which, by decomposition, forms our binder. Whether that pitch is produced from coking or non-coking coal, it will, under the conditions prevailing in the high-temperature retort, effect the desired binding. Again, we have not to contend with the breeze problem, since any smalls which may be produced about the plant, if they are sufficiently clean, would go back into the briquetting plant, and we should convert low-priced breeze and smalls into a high-priced standard article.

I am convinced from the inquiries I have made abroad, particularly in Scandinavia and France, that there is a ready market awaiting an article of this kind which has a bulk density half way between anthracite and ordinary gas coke—namely, about 60 to 70 c.ft. per ton—and there is offered an opportunity to recover some of our very valuable export trade. Here again, we have to supply the customers with what they want, and not with what we particularly desire to dispose of.

Possibilities of the Gas Industry.

Experiments which I have carried out with various grades of coal, particularly non-coking coals from anthracite to lignites, have indicated beyond a shadow of doubt that the dense carbonized briquettes can be made from the widest possible variety of raw material; and it is easily conceivable that a far greater range of coals can be usefully employed in gas undertakings than formerly. The possibility is opened out for the gas-works to use the cheapest and most conveniently available coal in the vicinity, instead of having to pay railway transport on a specific coking coal from considerable distances. This would cheapen the cost and put the gas undertakings in a better position to compete in home and overseas markets alike.

I am convinced that unless we can make a smokeless fuel attractive to the community, not only by guaranteeing a standard article to a specification, thereby preventing any adulteration, but by producing and selling at the right price, we shall have to wait for an Act of Parliament before we can tackle the smoke abatement problem satisfactorily. It has been stated in the Daily Press that low-temperature smokeless fuel is too expensive, and that only enthusiasts would use it. There is something to be said for this, because, although the production of smokeless fuel at low temperatures has reached proportions which were undreamed of a few years ago, the total production is still negligible in comparison with the demand for domestic fuels. Unless production is carried out on a large scale, assisted by proper distributing channels, avoiding unnecessary expense in transport, sales, and so on, we shall not be able to proceed at the rate which the plight of the coal industry to-day demands. The Gas Industry, by co-operation, can very greatly assist in shortening the purgatory of the coal industry.

It is quite clear to me that the scheme I have outlined is not by any means perfect. There are doubtless fallacies which I have overlooked, but if I can, by putting forward a tentative scheme, raise useful and constructive criticism—the ultimate goal being the closer co-operation and co-ordination between science, coal producers, the gas interests, and low-temperature carbonization—my purpose has been served. Too often one hears of the resistance of vested interests, but surely in face of the present emergency we cannot talk about vested interests—they simply do not exist. The "Gas Journal" has done very real service to the coal industry by inviting the co-operation of all the best brains for the common weal.

POLISH GAS AND WATER ASSOCIATION

The Annual Conference of the Association was held in Warsaw on May 11 to 14, under the Presidency of Mr. C. Swierczewski, the Director of the Gas Department of the Warsaw Municipality.

At the opening session, after a welcome from the Mayor of Warsaw, and verbal greetings from the representatives of kindred associations in other countries, the President submitted an Address which dealt at some length with the recent extensions and reconstruction of the Municipal Gas-Works.

On the second day of the conference the official inauguration of the reconstructed gas-works took place in the presence of a large gathering of the members of the Association and a number of representatives of Polish Municipal and Government Departments. The official ceremony took the form of the cutting of a ribbon stretched across the main road into the gas-works, and was performed by the Vice-Minister of Poland for Trade and Industry, Mr. F. Dolezal. Among other distinguished visitors were the Minister of Railways and Communications (Mr. A. Kuhn), the British Ambassador (Sir William Erskine, G.C.M.G., M.V.O.), the Mayor of Warsaw (Mr. Z. Slominski), the Chairman of the Gas Committee (Mr. J. Tluchowski), the President of the Polish Gas and Water Association, the Vice-Director of the Gas Department (Mr. S. Torzewski), and Mr. F. J. West, C.B.E.

After the opening ceremony an inspection of the extensions took place, and a great amount of interest was shown in the installation of Glover-West vertical retorts, which has now been in successful operation for a period of over twelve months.

A very successful conference terminated with a banquet on the evening of the third day, at which speeches were given by visitors from France, Czechoslovakia, and England.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany

ECONOMIC AND TECHNICAL CONSIDERATIONS IN THE CHOICE OF GASHOLDERS.

B. Nerreter, in "Das Gas-und Wasserfach," 1931, 74, 373-378, April 25, gives an account of the investigation which was undertaken at the Essen Gas-Works with a view to a decision as to the size to be adopted for a new holder which had become necessary. At Essen, the gas supply is drawn from coke-ovens. The volume of gas distributed in 1928-29 was 1750 million c.ft., and the annual demand is increasing. The existing holder capacity was $2\frac{3}{4}$ million c.ft., and the maximum volume of gas which had, so far, been sent out in one day was approximately 8 million c.ft. The intention was to choose a holder of such a size that, with due allowance for the anticipated increase in the annual demand for gas, a reasonably long period should elapse before the storage capacity would fall below 50 p.ct. of the maximum daily volume of gas distributed. Calculations were made showing the number of years which would elapse before such a state of affairs would arise with a new holder of various sizes, and on the assumption of different rates of increase in gas sales—namely, 3, 5, and 8 p.ct. (compound) per annum. In connection with each set of calculations, it was assumed that, each year, 4 p.ct. of the capital involved would be written off and that 8 p.ct. interest on the balance should be allowed. The cost would thus be paid off in 25 years. Hence, for example, if a 9 million c.ft. holder at a cost of £78,000 had been chosen, and a compound yearly increase of 5 p.ct. in the gas consumption had been assumed, the capital charges for the first year would have been £9360 (= 1·17d. per 1000 c.ft. sold in the year) and in the last year £3370 (= 0·144d. per 1000 c.ft. sold in the year). The total capital charges over the period would have been £159,000 (= 0·42d. per 1000 c.ft. of gas sold, after due allowance for the fact that in the last two years the total holder capacity would have been less than 50 p.ct. of the maximum day's consumption—*i.e.*, the consumption is assumed to increase annually by 5 p.ct. (compound) for 23 years and then to remain constant).

In the same way, figures were worked out showing the charges which would have been involved for a smaller holder installed forthwith, followed by additional holders as necessary. The schemes considered were (1) 9 million, (2) $4\frac{1}{2}$ + $4\frac{1}{2}$ million, (3) 3 + 6 million, (4) $2\frac{1}{4}$ + $2\frac{1}{4}$ + $4\frac{1}{2}$ million, (5) $2\frac{1}{4}$ + 3 + $3\frac{3}{4}$ million, (6) 3 + 3 + 3 million, and (7) $2\frac{1}{4}$ + $2\frac{1}{4}$ + $2\frac{1}{4}$ + $2\frac{1}{4}$ million. In this connection a table is given, showing the dimensions, weight, and cost erected (including cost of ground and foundations) of waterless holders ranging in capacity from $2\frac{1}{4}$-$10\frac{1}{2}$ million c.ft. With holders having a disc capable of throwing a pressure of 12 in. W.G., these costs range from £27,500 to £88,000 (= (say) 24s. 6d. to 16s. 8d. per 1000 c.ft. of storage capacity). When waterless holders were compared with telescopic holders it was found that, for capacities greater than $2\frac{1}{4}$ million, the advantage in cost lies with the waterless type.

The final decision was to order a $4\frac{1}{2}$ million c.ft. holder and to install an additional holder when necessary.

Particulars are also given of the two chief types of waterless holders, the M.A.N. type which is polygonal in cross-section and the Klönne type which has a circular cross-section. The differences in the construction are pointed out, with special reference to the means for providing the seal. As regards the M.A.N. type, which has a liquid seal, a special oil has now been developed as an improvement on tar. In the Klönne type, a packing ring of rubberized cotton is employed, though latterly a facing of special leather vulcanized on to the ring has been adopted with a view to the provision of a seal impermeable to gas and not attacked by it. The surface of the packing ring is lubricated by means of a series of Stauffer boxes spaced 4 ft. apart. It may be questioned, however, whether uniform lubrication can always be maintained.

The M.A.N. type offers advantages over the Klönne type as regards the guide rollers of the disc, since they are all accessible from above in the former type, whereas in the case of the Klönne holder, some are in the gas space. On the other hand, continuous circulation of sealing liquid is not required with the Klönne holder, and the shape and construction of this holder are more suitable from the point of view of resistance to wind pressure, &c.

Finally, information is given as to the length of the shadow cast at different times of the day at Essen in different seasons by a waterless holder 164 ft. in diameter and 262 ft. high. The shadow in the morning and evening (5 a.m. and 7 p.m.) in May and August is as long as 1300 yards, while at mid-day it is only 60 yards long. On the shortest day of the year, the minimum length of the shadow is 325 yards—at noon. The question of shadows may in some cases be of importance; for example, in the case of orchards in the vicinity of the holder.

THE EXPERIMENTAL DETERMINATION OF THE OXYGEN CONTENT OF FUELS.

M. Dolch and H. Will in "Brennstoff-Chemie," 1931, 12, 141-146 (April 15) and 166-169 (May 1) describe methods available for the determination of the oxygen content of organic compounds with special reference to its determination in fuels.

The customary practice is to determine the constituents other than oxygen and to regard the balance as oxygen and errors. The method of Ter Meulen and Heslinga, in which oxygen is directly determined, depends on the hydrogenation of the compound with nickel as catalyst. The oxygen present is converted into carbon dioxide and carbon monoxide, these being then reduced to methane and water, which latter is determined by absorption. The method was investigated and was found to be unsuitable as a general one since reduction of the oxides was incomplete, and even when the unreduced oxides were determined and allowance was made for the oxygen present in them, the results were still low.

Another possibility is to make use of the mathematical relationship which exists between the ultimate composition of an organic compound and the carbon dioxide content by volume of the dry waste gas obtained when the compound is burnt in the theoretical amount of air. Experimentally, the compound may be burnt in a stream of air in a silica tube at a high temperature, and the water and carbon dioxide formed may be determined, the surplus air together with the nitrogen resulting from the air used in the combustion being collected and measured. When the oxygen content of this gas is determined, allowance can be made for the excess air, and the nitrogen equivalent to the air actually used can be calculated. From this and the amount of carbon dioxide produced, the percentage carbon dioxide content by volume ($CO_{2\,Max}$) of the theoretical dry waste gas may be calculated. The percentage carbon (C) and hydrogen (H) contents are calculable from the weights of carbon dioxide and water obtained. Then if O denotes the oxygen content of the compound and no nitrogen or sulphur is present,

$$O = 8H + \left[3{\cdot}368 - \frac{100}{1{\cdot}42875\ CO_{2\,Max.}}\right]C.$$

The atomic weights of oxygen, carbon, and hydrogen are, for the purpose of this formula, taken as 16, 12, and 1, and the oxygen content of air as 20·8 p.ct. by volume.

By taking suitable precautions, combustion of the compound may be rendered complete even though, in this method, copper oxide and lead chromate are not used. Allowance may be made for any sulphur dioxide absorbed with the carbon dioxide, and a correction may be made for any nitrogen present in the fuel. Nevertheless, small errors inherent in the method render it insufficiently accurate.

A further method developed by the authors is based on simultaneous determination of the carbon and hydrogen contents of the fuel and of the amount of oxygen used for its combustion. It is applicable both to solid fuels and to tar. The sample contained in a platinum boat is burnt in a circulating stream of oxygen in a closed circuit by help of a circulating pump device. Complete combustion is secured since a portion of the heated section of the combustion tube is packed with fragments of quartz. The water, carbon dioxide, and sulphur dioxide formed are continuously absorbed from the circulating gas by calcium chloride and soda lime. A separate determination of the combustible sulphur is made, and the amount of sulphur dioxide equivalent to this is deducted from the increase in weight of the soda lime tubes. The diminution in the volume of gas in the system after the apparatus has cooled to the original temperature is measured by an appropriate pipette and burette, and the volume of oxygen present in the carbon dioxide, water, and sulphur dioxide is calculated. The difference gives the content of oxygen + nitro-

gen in the fuel. Allowance may be made for the nitrogen present in the fuel, and the oxygen content is thus obtainable.

An illustrated description of the apparatus is given with experimental details and results.

DEVELOPMENTS IN AUTOMATIC GAS ANALYSIS.

H. D. Brasch in "Das Gas- und Wasserfach," 1931, 74, 428-431 (May 9) describes apparatus made by the Mono G.m.b.H. for the automatic determination (1) of hydrogen and methane in mixtures of these gases and nitrogen, and (2) of carbon dioxide, hydrogen, and carbon monoxide in producer gas.

The first apparatus (the Duplex-Mono) contains two furnaces, one at a low and one at a high temperature. Measured volumes of gas and air pass by way of a moving stop-cock through the two furnaces alternatively, the combustion products leaving the furnaces being measured after passage through potash. The diminution in volume resulting from the low-temperature combustion represents 1·5 times the hydrogen content, that from the high-temperature combustion 1·5 times the hydrogen content + 3 times the methane content.

The second apparatus (the Triplex-Mono) has one furnace. The several automatic operations are as follows:

(1) The gas is passed into potash, the reduction in volume giving the CO_2 content.
(2) The gas, with air, is passed though the furnace and is then measured. The contraction in volume is 1·5 times the hydrogen content + 0·5 times the carbon-monoxide content.
(3) The gas, with air, is passed through the furnace, then through potash, and is finally measured. The reduction in volume is equal to the carbon-dioxide content + 1·5 times the hydrogen content + 1·5 times the carbon-monoxide content.

From the recording chart these values may be read, and the concentration of each constituent may be calculated. A more complicated apparatus registers the individual concentrations directly and obviates calculations.

Croydon Company's Ninth Annual Co-Partnership Meeting

The Ninth Annual Co-Partnership Meeting of the Croydon Gas Company was held in the North End Hall, Croydon, on Monday, May 11—Mr. WILLIAM CASH (Chairman of Directors) presiding. Among those present were all the Directors of the Company, except Mr. Henry Woodall, including Mr. William Cash, Junr. (who has been appointed to fill the vacancy caused by the death of Mr. Percy Hedley Hall), Mr. W. J. Sandeman (General Manager), Mr. W. Grogono (Engineer), Mr. F. F. Wood (Secretary), Mr. M. O. Coates (Editor of the Company's Co-Partnership Magazine), and other members of the Co-Partnership Committee. The North End Hall was filled with an enthusiastic attendance of co-partners and their wives and friends.

MR. WILLIAM CASH'S ADDRESS.

In the course of his address to the co-partners, Mr. Cash first welcomed on behalf of the Directors those present, remarking how pleased the Board were to meet them all once more.

Mr. Cash then went on to deal with the Co-Partnership Report, which, he said, was much on the same lines as last year. It would be seen that the bonus was again 7 p.ct. for the third year in succession, and that there were increases in the amount of the bonus, in savings and deductions for life assurance, in interest credited to co-partners' accounts, and in the amount held by Trustees for co-partners at March 31. The only sum down was the amount invested by co-partners in the Company's stock. He thought they would be wise, when they had the opportunity, to invest money in the Company's stock, for it stood higher to-day than it had ever done—that is £108-£110 for every £100 stock.

This year were set out the names of seventeen co-partners who had retired on pension, while the Committee regretted to record the deaths of two co-partners and seven pensioners, three of whom, unfortunately, had only retired a few months previously. This year there were ten long-service awards. He called attention to the fact that there were now 572 subscribers to the Company's Sports Fund, compared with 533 last year, while the amount contributed was larger. Ten more co-partners, making a total of 93, had joined the club formed in connection with the Croydon Nursing Service.

In accordance with the Finance Act of 1930, the Commissioners of Inland Revenue had approved the Widows' and Orphans' Fund from April 5, 1930, as an approved Superannuation Fund, and all income of this portion of the Pension Fund would now be free of income-tax. This particular fund, said Mr. Cash, had been inaugurated at the co-partners' own wish.

INVESTMENTS.

During the year further investments on account of the Pension Fund had been made to the extent of £59,426 outside the Company. The Co-Partnership Magazine had been well supported, and they owed a debt of gratitude to the Editor, Mr. Coates. He (Mr. Cash) congratulated the Hospital Committee on their work during the year. The balance to the credit of co-partners at March 31, 1930, was £34,000 and at March 31, 1931, £41,000. Year after year they had been trying to build up the Widows' and Orphans' Fund, and this year they had £257,000 balance in the hands of the Company and invested in the names of four Directors as Trustees. The Company were still making a special contribution of £10,000 annually to this Fund, and interest was now beginning to pile up, having amounted this year to over £10,000.

In the report, continued Mr. Cash, they would see a statement of investments, amounting in all to nearly £209,000. A large proportion of these were in Government securities, colonial government stock, and English railways. Notwithstanding the fall in the prices of stocks, the value of their investments at March 31 was within £3700 of the figure which they originally cost them, which was very satisfactory in these bad times.

AMALGAMATIONS.

A year ago, continued Mr. Cash, mention had been made of the fact that they were trying to carry through an amalgamation with the East Surrey Gas Company, by which the undertaking would be known as "The Croydon and East Surrey Gas Company." But although they were in agreement with the East Surrey Company, the matter had to go before the Board of Trade, who took objection to certain of the terms, with the result that this part of their Order did not go through. They were sorry about it, but it could not be helped. So far as the amalgamation with the Oxted Company was concerned, however, this part went through and was effected as from the previous Saturday. They considered that the Croydon Company, with their organization and better service and wider methods, would be of advantage to consumers in the Oxted area, which, from the point of view of gas supply, could be much extended, and business increased there. Ultimately they expected to make all the gas at Croydon and pass it through to Oxted.

WORKS EXTENSIONS.

At their works they had just given the order for another set of vertical retorts. A year ago they brought the first set into operation, and they were so pleased with the results that they were now putting up a new set, and some of the horizontal retorts were coming down.

The increase in sales of gas in 1930 over 1929 amounted to between 9 and 10 million c.ft., or 0·32 p.ct. Their Engineer, Mr. Grogono, had been enlarging the carburetted water gas plant, and they had opened new showrooms at Wallington. A sum of £10,000 had been put to Renewals Fund, and the carry-forward was increased by £8147. Just under £1000 had been placed to Reserve Fund, which was the maximum amount permissible in view of the present price of gas and the present dividend. At the general meeting a unanimous vote of thanks had been passed to the staff, and he was sure that the shareholders appreciated that the Company was well served by all their officers and workmen. Mr. Cash mentioned that small prizes were given to workmen for suggestions which were adopted.

WILLING SERVICE.

Referring to the meaning of co-partnership, Mr. Cash said that while each man was trying to do his duty, he wanted them to understand that duty meant service willingly. Co-partnership meant bringing into operation mutual help. He had already referred to what they were doing for the hospitals; and there were other cases of distress where assistance had been given ungrudgingly where necessary. But there was nothing to compensate for lack of goodwill—which meant an interest in what they were doing.

All the Gas Industry was asking for to-day was fair play. They had great competition with electricity, oil, anthra-

cite, and so forth. As regards electricity, it seemed curious that it should need so much booming. But people should not forget that if electricity was boomed to such an extent as to take away business from another industry, it was doing injury to a number of individuals. There was plenty of room for both without taking away business from either.

Their Co-Partnership Committee met regularly every three months, and Mr. Cash said he had pleasure in meeting this Committee and could tell those present that evening that their interests were well looked after by that Committee.

Last year Mr. Percy Hedley Hall was a Director of the Company, and they had been kind enough to give certificates to three of the Directors for 25 years' service to the Company. Mr. Hall had joined the Board from the Caterham Company upon its amalgamation with Croydon in 1905, and only fifteen days after he had become eligible for a similar certificate he passed away. They much regretted his loss, for he was a solicitor and did very good work for the Company. This left a vacancy on the Board, continued Mr. Cash, and his colleagues did him the honour of asking his son to come on to the Board. His son would speak to them in a few minutes.

In conclusion, Mr. Cash remarked that the world-wide outlook was bad; trade was bad; and dividends were decreased. But in their Industry it was a fact that they were doing quite well; their dividends were steady, which was due, in a measure, to their peculiar position. They were a sheltered Industry, and in the Gas Industry there was no unemployment. But they must have sympathy with others. They had confidence in their Industry, and they would go forward with that confidence into the future. But it meant hard work.

Mr. Cash then formally moved the adoption of the co-partnership report and accounts, which was carried unanimously.

A Disagreement!

Mr. William Cash, Junr., said it was a great privilege to be allowed to interrupt their proceedings for a few moments in order to disagree with the Chairman in saying the Board were very pleased to see them all there once more. "I am not," said Mr. Cash, Junr., "for the reason that this is the first time I have met you here; but I hope it will not be the last." He referred to the great interest the Chairman took in the Company. "In this machine age in which we live," continued Mr. Cash, Junr., "—this age when you press a button, and the world works for you—I think it is true to say that what the average man and woman in industry wants more than almost anything else is to be recognized as a separate personality and not merely as a cog in the machine. [Applause.] And I firmly believe that as this machine age goes on, more and more attention has got to be paid to that recognition of the individual without which modern industry will become—master and man—slave to the machine. With co-partnership in industry, such as in the Gas Industry, with which I have had some familiarity over many years, I maintain that we are going a long way towards the solution of the problem by recognizing the standing of the co-partner."

Long-Service Awards.

Long-service awards were then presented by the Chairman to the following, who have completed 25 years' service with the Croydon Company: E. S. Allsopp (Fitter, William Cash Workshops); W. E. H. Besley (Prepayment Collector); F. Bowles (Lamplighter); F. W. Evans (Prepayment Collector); H. E. Gardiner (Clerk, Rental Department); E. U. Greenleafe (Prepayment Collector); G. W. Hutchins (Prepayment Collector); W. Kirby (Mains and Service Ganger); T. J. O'Brien (Carbonizing Foreman); and W. J. Stevens (Assistant Sulphate Maker).

A vote of thanks to the Chairman was carried with acclamation upon the proposition of Mr. G. E. Walkley, who referred to the great interest Mr. Cash took in the welfare of the Company.

The Chairman briefly responded.

During the evening refreshments were served, and an entertainment was provided by "The Roosters'" Concert Party.

NOTES ON PLANT AND PROCESSES

A Fletcher Gas Cooker Catalogue.

Great advances have been made in recent years in the design and the exterior finish of the gas cookers manufactured by Messrs. Fletcher Russell & Co., Ltd., of Palatine Works, Warrington (Radiation Limited, Proprietors), and a summer catalogue just published is a proof of definite achievement.

The catalogue, which is attractively produced, with coloured illustrations, sets forth some of the special features of the Fletcher cookers, with particular attention to the "Kingsway" and "Queensway" New World designs. Points of interest in the "Kingsway" are the white enamelled back plate and plate rack, "Rado" boiling burners and disc-bar hotplate, "Regulo" oven heat controller and safety tap on the oven to prevent interference by children. The oven has one burner, with direct bottom flue outlet, while the oven shelves slide on projections embossed on the smooth enamel sides, leaving no ironwork to be cleaned. The oven bottom plate closes the bottom of the oven, keeping out dust and adding greatly to the appearance of the oven. The drip-tin can now be used on the higher shelves as a meat tin, if required.

A number of these features are described in some detail, and the catalogue then goes on to describe and illustrate, with full specifications, various types of "Kingsway" cookers to suit different demands and purses. Details are given of the double oven range and also of a number of larger types of hotplate.

The publication then goes on to deal with the "Queensway" New World gas range, which has previously been noticed in these columns, while the final sections are devoted to hotplates, including the "Clifton" and "Talbot," grillers, boiling burners, and water heaters, including the "Celerity," an attractive little heater which has also been mentioned before in these pages. In conclusion a section gives specifications of Fletcher wash-boilers of various designs.

It is stated that the "Rado" porcelain enamel extensively used in Fletcher cookers is the result of long and costly experimental work. In the process of manufacture it is practically fused into the metal, producing an almost imperishable surface, with a high, even gloss.

"Ideal" Gas Boilers.

A booklet issued by the National Radiator Company, Ltd., of Hull, explains in detail, with a number of tables, photographs, and diagrams, the principles of design and operation of the firm's "Ideal" gas boilers, for heating and indirect hot water supply.

Complete combustion of gas and absorption of heat is ensured in these boilers by special features in their construction. The luminous flame burners prevent gas and air mixing in the burner so that the possibility of back-firing is eliminated. The air necessary for combustion mixes with the gas in the combustion chamber, resulting in quiet fan-shaped flames. The draught diverter prevents excessive draughts or down-draughts. Automatic gas control is provided to avoid overheating and consequent waste. The ground edges of sections ensure gas-tight joints. All flue surfaces are easily accessible for cleaning. The boilers occupy little space and are fitted with insulated jackets to conserve heat. The light grey and black enamel finish gives them a handsome appearance.

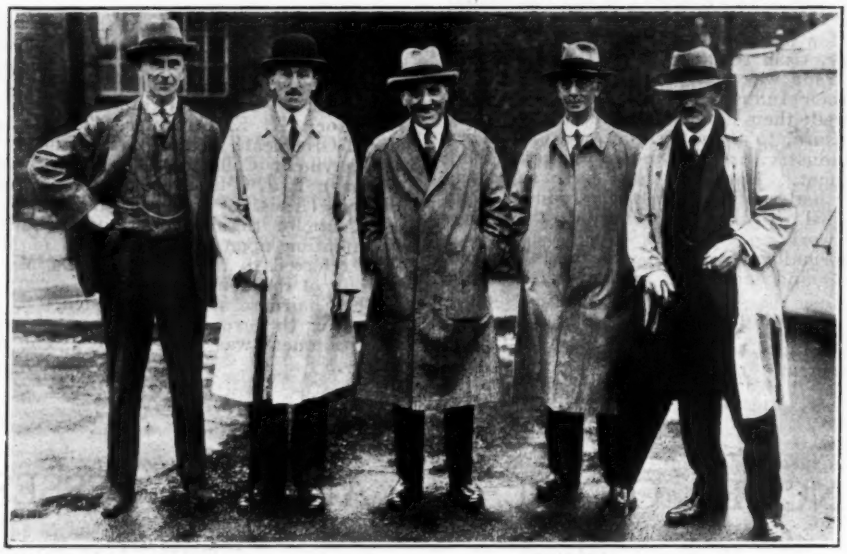
The booklet goes on to give tables of ratings of various sizes of "Ideal" boiler, ranging from a gas consumption of 60 c.ft. to 360 c.ft. per hour, with direct radiation varying from 150 sq. ft. to 900 sq. ft. Further sections are devoted to the thermostatic control, the "self-pilot," and the governor. A control of the relay type is provided, sensitive in action and operating within fine limits. The graduated thermostat is in circuit with the control valve (which must be fixed truly horizontal) through the secondary tubes, a small quantity of gas passing down from the thermostat to the escape jet where it is allowed to burn. As the desired temperature of water at the boiler is attained, the thermostat throttles the flow of gas through this secondary circuit, causing an increased pressure above the diaphragm in the control valve, which, working against the main gas supply below the diaphragm closes the valve, and so cuts down the main supply to the burners to the minimum required for the self-pilot flames.

In conclusion, instructions are given as to the cleaning of the flues and in regard to lighting up of the boiler, while a table is included of the dimensions of the various sizes.

THE "JOURNAL" TECHNICAL RECORD

Which contains Full Reports of Meetings of Gas and Allied Associations

Southern Association Visit Tottenham



AT THE GOTHIC WORKS OF MESSRS. GLOVER & MAIN.

On Friday last members of the Southern Association of Gas Engineers and Managers had a full day. During the morning they inspected the Works of the Tottenham Gas Company, of which their President, Mr. H. C. Smith, is Chief Engineer. Then, at the invitation of the Chairman and Directors of the Company, they adjourned to Woodall House, where luncheon was served. Following this, a visit was paid to the Edmonton Works of Messrs. Thomas Glover and R. & A. Main, Ltd., where an interesting afternoon was spent in witnessing the manufacture of dry gas meters and cookers and fires. Throughout, the excellent arrangements assured a pleasant and useful excursion.

The plant at the Willoughby Lane and Lee Side Works of the Tottenham Company provides great variety, and is modern in all respects; the lay-out of the different units is worthy of unstinted praise. There are two houses of horizontal retorts, one having a capacity of 2 million c.ft. a day, and the other 4 millions. The retorts are of moulded fireclay, moulded siliceous material, and silica sections; and in both houses recovery of waste heat is practised. Then there is a retort house of Woodall-Duckham verticals of a capacity of 6 million c.ft. per diem, complete with waste-heat boilers. The exhausting plant for the vertical section is particularly interesting. It consists of two Conner[illegible]e exhausters, each having a nominal capacity of 9 mi[illegible] c.ft. a day, driven by Bellis & Morcom compound e[illegible]nes, the steam condensing arrangements being in comm[illegible] with the electric generating sets. There is also a carburetted water gas plant of five units, three of which are operated on the back-run principle. The total capacity of this plant is 6 million c.ft. a day.

In view of the President's Address in March last, naturally those present were anxious to inspect the "Dri-Gas" and naphthalene washing plant, constructed by Messrs. W. C. Holmes & Co., Ltd., which was put to work in November, 1929. The plant, which is exceedingly well-arranged, consists of two units, each having a nominal capacity of 8 million c.ft. a day. Much interest, too, was evinced in the new arrangements for keeping the general works stores, the natural lighting of which premises is particularly effective. The Widlake pressure recorders also attracted a great deal of attention.

Light refreshments were served in the Sports Pavilion, which is the Company's War Memorial, and then the visitors left for Woodall House. This property was originally built as the Royal Masonic Institution for Boys, and was later occupied as the Home and Colonial Training College for Teachers. It was purchased by the Company in 1930, and has been converted for use as Chief Offices. The premises are splendidly equipped, and admirable in all respects for the purpose. It was here that the visitors were the guests of the Chairman and Directors of the Company at luncheon.

Following the Loyal Toast,

Mr. HENRY WOODALL, M.Inst.C.E. (Chairman of Directors), proposed the toast of "The Southern Association of Gas Engineers and Managers." On behalf of his colleagues and himself he offered those present a very hearty welcome. In any case, he said, they would be glad to see them, but their pleasure was the greater as they had honoured their Chief Engineer, Mr. H. C. Smith, by making him their President. They highly appreciated his services, and recognized his ability, energy, and enthusiastic belief and faith in his Company and in the Gas Industry. Their President had been in charge of the Tottenham Works for nine years, and during that time there had been considerable extensions which had greatly assisted economical working and resulted in better service to the community.

WOODALL HOUSE.

This was the first occasion on which there had been any ceremony at Woodall House, and it gave him much pleasure to see so many of his old friends there. He thought they would agree with him that they had little to complain of in their quarters; and he would like to take this opportunity of thanking and congratulating the Architect, Mr. Douglas Robinson, and also the Builder, Mr. C. R. Price, on the excellent work they had done. That his colleagues should have decided to name their new offices "Woodall House" had naturally much gratified his family and himself. His late father and he had served on the Board of the Company for 48 years, and for most of the time as Chairmen. This was more than half the lifetime of the Company. During that time it had greatly in-

creased and prospered, and there seemed every reason to suppose it would continue to do so. He hoped that Woodall House would always be a centre of progress, and that the Company would do its share to carry on the good old traditions of their Industry. The offices were in a central position in their district, and, though their property there might seem rather extensive, he was happy to say that, when it was fully developed, they would find that they had really fine offices and, in addition, that they had made a good investment.

Might he be allowed to say one word about Chairmen and Directors? By some they might be regarded as necessary—he was going to say evils—but at least necessary. They knew how important it was that the management and staff should work together, and they would be the first to admit that success depended to a large extent on the relations which existed between all parties, and that Chairmen and Directors had an important and sometimes a difficult task. The officials at Tottenham were most tactful men, and they certainly led the Directors to suppose that they were helpful. He certainly enjoyed working with Mr. Smith and their able Secretary. He believed that in the vast majority of cases the Boards and officials of gas companies were the complement one of the other, with the result that there were few industries which had carried on more successfully than the Gas Industry through good and bad times, or whose employees realized more fully that their interests were continually kept in mind.

Continued success, observed Mr. Woodall, was not due entirely to luck; and he had been thinking that possibly the reason why Sir David Milne-Watson and himself had been so fortunate in their relations with those with whom they had to work was that they were brought up to believe that the proper study of Mankind was Man. The success of their undertakings might be due to some extent to the knowledge and understanding so obtained.

He would like especially to welcome their guests. They were proud to have with them Sir David Milne-Watson, an Honorary Member of their Association, than whom none was a more honoured guest among gas men, who realized how much he had done and was doing for the Industry. To Mr. Ronca they also gave a very hearty welcome; they looked upon him as one of themselves—a guide, philosopher, and friend. He could not name all their other guests, but he must say that they were very glad to have with them Mr. E. Stanley Brown, Chairman of the Tottenham Urban District Council; Mr. H. Barrass, Chairman of the Edmonton Urban District Council; Mr. C. H. Nash, Deputy-Chairman of the Wood Green Urban District Council; and other gentlemen connected with the Local Councils in their area. He hoped that this visit to the works would prove to them, if proof were needed, that they spared no effort to supply the public with a good article of regular quality and pressure, that they cared for the welfare of their employees, and did all they could to deserve the respect and support of the district they supplied. [Applause.]

Mr. H. C. Smith, with whose name the toast was coupled, thanked Mr. Woodall most heartily for his generosity to the Association. He (the speaker) was proud to think that the first public function of any kind held at Woodall House was the entertainment of the Southern Association; and he was sure that they were all glad that such an important building should bear a name which had been associated with the Company so long, and which was so highly honoured throughout the Gas Industry.

Mr. Thomas Goulden, M.Inst.C.E., proposed the toast of "The Visitors." In doing so he said how much they all regretted the unavoidable absence of Mr. Broadberry, who had laid the foundations on which Mr. Smith had built. Under Mr. Smith's guidance they had carried out at Tottenham a thorough and gradual scheme of reconstruction, and in many respects it could be said that the Company was in advance of the times. The criterion of the value of their work was that they had been able to keep down the price of gas, and at the same time remain in a good position financially. Mr. Smith had ably succeeded in carrying out all the work which had been set before him; and certainly the Company could now claim to have a distribution system second to none. Then there had been the installation of the plant for drying gas, which had resulted in practically complete absence of complaints of stoppages. The Company had made good progress in regard to water heating, and they recognized the merits of coke, the revenue from which represented a fifth of that from gas. Concluding, Mr. Goulden expressed their pleasure at having with them Sir David Milne-Watson and so many representatives of local bodies in their area.

Sir David Milne-Watson, LL.D., D.L., remarked that it was difficult for him to realize that he was in the position of guest that day. He had known the Tottenham Company for a long time, and he had always been filled with admiration for it. There were names connected with the Company which were household names in the Industry—Sir Corbet Woodall, Mr. Henry Woodall, and his son, and Mr. Broadberry. And now there was Mr. Smith, who had so honourably assisted in its affairs, and Mr. Fussell, the Secretary. He (the speaker) was glad to be at Woodall House, a noble building and a worthy home for the Gas Industry at Tottenham.

Councillor E. Stanley Brown, J.P., Chairman of the Tottenham Urban District Council, said that when one heard so much about trade depression it was good to see an Industry which was making the most of its opportunities of getting ready for a trade revival. He was glad to know that the Southern Association had elected Mr. Smith their President. He had been interested in noticing in a paper that in 1861 his Council spent £416 on public lighting. To-day they were spending £11,000 on this, and there were many who thought that Tottenham was still insufficiently lighted. The Tottenham Gas Company, in its career of 85 years, had progressed to its present position by dint of hard work and concentration on public service.

Councillor H. Barrass, J.P., Chairman of the Edmonton Urban District Council, and Councillor C. H. Nash, Deputy-Chairman of the Wood Green Urban District Council, also replied on behalf of the visitors.

The final toast was "The Tottenham and District Gas Company," which was proposed by Mr. R. H. Ruthven, who commented on the excellent way in which the Board of Directors of the Company was constituted, and on several phases of the Company's aim of customer-service.

Reply to the toast was briefly made by Mr. Woodall.

How Meters and Cookers are Made.

The company then left for the Gothic Works, at Edmonton, of Messrs. Thomas Glover & R. & A. Main, Ltd., where, again, excellent arrangements had been made for the comfort of the guests, who had a good opportunity of seeing the latest methods of manufacture of dry gas meters and of cookers and fires.

The various shops of Messrs. Thomas Glover proved of great interest. In the engineering shop are manufactured all the special jigs, tools, and precision devices required in the manufacture of gas meters; and an opportunity was afforded of inspecting the high quality of the materials used. Most of the many processes involved in the construction of meters are carried out by the firm, and provision is made at every stage for thorough inspection. The machinery for the stamping and piercing of tinned metal parts claimed much attention. The meter shop proper is, we understand, the largest of its kind in the kingdom. Here could be seen gas meters in process of manufacture and repair. The testing apparatus in this

department was made entirely by the firm. Ordinary meters arrive at the test holders three times, and prepayment meters four times, during course of manufacture, for sounding, setting valves, testing prepayment valves, and final testing for registration. In the brass shop the visitors were confronted with rows of automatic and semi-automatic machine tools, all devoted to the manufacture of the various brass and white-metal parts of gas meters.

The next stage of the tour was the iron foundry, which is devoted almost entirely to the products of Messrs. R. & A. Main. Here could be seen in the "undressed" state various parts for Main cookers and fires. Casting was in progress, which greatly added to the interest of the visitors. Up-to-date methods of core-making, fettling, and grinding were examined, and it was noticed that every casting is critically examined before being passed for stock. A new Berlin blacking plant attracted much attention, and the enamel shop proved a fascinating department.

Throughout, the various departments are so interlinked that the raw material passes from stage to stage, and finally emerges as a carefully-packed finished article ready for an equally efficient road transport system, with the minimum loss of time, and consequently without wastage of effort and expense.

At the conclusion of the tour, Mr. H. C. SMITH voiced the thanks of the Association to the firms of Glover & Main: and Mr. KENNETH AIRD briefly replied.

Western Junior Gas Association

Visit to the Works of Messrs. E. Cockey & Sons, Ltd., Frome

WESTERN JUNIOR GAS ASSOCIATION AT MESSRS. COCKEY'S, FROME.

The Association visited the Works of Messrs. E. Cockey & Sons, Ltd., at Frome, on May 2, and were welcomed by Mr. J. Button (Chairman of Directors) and Mr. W. Roger (Works Manager), Mr. Button remarking that although they were an old firm in point of years, they were thoroughly up-to-date in the work which they turned out.

After light refreshments had been served, the party proceeded round the Works. The origin of the firm dates back over a century, when it carried out iron and brass founding and general engineering work. As the Gas Industry grew in importance, Messrs. Cockeys gradually relinquished most of the other business, and devoted their attention to the manufacture of gas-works plant. The present works were built in 1893, and with recent extensions now cover 4½ acres.

The pattern shop, machine shop, constructional steel shops, and the foundry were visited in turn, each shop being fully equipped with modern electrically-driven machines. A considerable time was spent in the foundry viewing the casting of purifier tank plates.

The members then adjourned to the George Hotel, Frome, where Mr. B. F. HARRIS (Senior Vice-President) occupied the Chair.

PRESIDENTIAL ADDRESS

of Mr. A. BARRETT, of Frome.

The conditions in regard to our Industry are changing so rapidly that the ordinary junior on a works sometimes wonders what is the best line of action he can take in providing for his future position. In the light of the present policy for rationalization and amalgamation, it seems that in the near future the small works will have ceased to exist, and will have been absorbed by the larger concerns, yet, in my opinion, there is still scope for the man who wishes to go in for general management on a small or medium sized works. There are 560 works selling less than 50 millions per year, accounting for an annual sale of 9646 millions; 135 works over 50 and less than 100 millions output, accounting for a total sale of 9882 millions; while works over 100 millions are 280 in number, accounting for a sale of 247,092 millions. These figures show that the practical chances for the junior aspiring to become manager of a works are about two to one in favour of his having to take a small one; and I think that to-day he would be very wise, when deciding his policy of training, to include some commercial knowledge in book-keeping and office routine, in addition to his ordinary technical course, for, if appointed to a small undertaking, he will have to be able to undertake the office management in addition to the works side.

Almost every works in the country is now faced with electrical competition, and to say that what sufficed in the past will not be sufficient for the future is merely a truism. For the small works, however, the meeting of competition is not so easy as for the larger works; and though it is not for juniors to consider policy, one feels that, if in conjunction with other schemes it were possible for small works to form a co-operative scheme, it would be productive of great benefit. I do not wish to detract in the least from the benefits obtained from a good showroom, but this in itself will not make good sales; it requires to be followed up by personal canvass and actual investigation of consumers' requirements. This, to the small works, is practically impossible; and I suggest that if a gas sales development section of the B.C.G.A. was formed, and a travelling showroom similar to what has been used by some of the larger concerns for country districts was employed, with a competent salesman in charge, tours could be arranged at regular periods, the districts being made conversant with all the latest improvements in a manner more effective than any small showroom could possibly do. Such a scheme would not entail any cost to the larger undertakings, as I am sure that a sufficiently large number of small undertakings could be combined and would pay the entire cost.

In Frome, we have not at present a showroom, but we have for years educated our fittings staff on points of salesmanship; and while the population of the town has remained practically stationary, the sales of fittings have steadily increased from a total of £68 in 1919 to £1212 in

1930, the sales of gas increasing concurrently from 49½ millions to 75¾ million c.ft.

Tariffs.

In these days of Government propaganda and support of electricity we should make ourselves familiar with the methods adopted by our competitors, particularly in regard to the tariff system, which can be made to appear very tempting to the unthinking consumer. The rate in operation in Frome is based on a two-part charge, calculated by taking the floor area and fixing an agreed number of units for the year. Any current used over the agreed quantity is charged at 1½d. per unit. The ordinary flat rate for non-tariff consumers is 9½d. per unit. The minimum charge which can be taken on the tariff scale is £3 per annum, which allows for 120 units. Taking the average lighting hours per year as four per day, and the lamp used for the living room as 100 watts per hour, with another 50 watts per hour per day for other rooms, you get a yearly consumption of 219 units, which would work out at a cost of £3 12s. 4d. for the year. Taking the gas equivalent and a poor-class gas burner, to make the comparison as favourable to the electrical unit as possible, and assuming a consumption of 5 c.ft. per hour as equal to the 100 watt lamp and 2½ c.ft. per hour as representing other rooms, you get a yearly consumption of 10,950 c.ft., which, at 4s. per 1000 c.ft., would work out at £2 3s. 10d. per year—or a saving of about 40 p.ct. With a good-class gas burner this saving would be greatly increased.

On grounds of cost, we have little to fear; but cost is not the only factor to consider, as people will purchase for more money something which they think is new, especially when it is well advertised and is given clever practical demonstration. I am not in a position to give you particulars of new processes or new plant. Like most small works, we are compelled to utilize to the best advantage the plant we possess, and by the adoption of various expedients try to reach the standards set by our colleagues in larger and better equipped works. When I was appointed by the Frome Gas Company, I was faced with the problem of small mains in the district, which had to be enlarged if the district was to be developed, and plant on the works which appeared to be out of date, but which on examination proved itself capable of adaptation. We decided on a policy of first completing the scheme of enlargement of the mains, and adapting the plant until this scheme was completed. This policy proved to be sound, and at a later date will enable some of the old plant to be replaced without creating financial difficulties.

Re-Laying Mains.

The particular problem in regard to the mains was a large amount of 2-in. cast-iron main which had been laid down when there was only a small cooking load, and at a depth of about 18 in. from the road surface. When we tackled the work of re-laying, we decided to do it in sections, one section each summer, the work being commenced in 1917, and the unaccounted-for gas dropped from 11 million c.ft. (18·44 p.ct.) in 1917 to 2½ millions (3·16 p.ct.) in 1929. The mains were not found to be broken, except in about four instances, but in almost every case vibration caused by heavy traffic had shaken the joints, and we found very few really sound samples on these small mains. The scheme is now almost completed, and we have spent during the whole period something like £11,500; but, taking the value of what has been saved in the unaccounted-for gas account, we find we are getting a return of something like 14 p.ct. on the cost.

The adaptations made to the plant on the works were interesting, and, in some cases, results were obtained superior to expectations. The purifying plant consists of four boxes, two 20 ft. by 20 ft. by 5 ft. 3 in., the remaining two 10 ft. by 10 ft. by 4 ft., controlled by a four-way inlet valve and a four-way outlet valve to each pair of boxes. The outlet from the washer-scrubber is connected to the inlet valve of the large boxes, and the outlet valve from the large boxes is connected to the inlet valve of the small boxes, so that whatever sequence is worked at least one large box and one small box must be in series. Our usual practice is to work all four boxes, and we find it of great advantage to use the small boxes as catch boxes, changing round the two large boxes each week, making them first and second boxes alternately. Whereas we usually had about six changes per box per year, under this system our changes are reduced to about three, and trouble from back-pressure is practically non-existent.

Another piece of plant which gave a certain amount of trouble was a washer-scrubber of the static type. This consisted of five chambers, the chambers being connected for the gas-ways by rectangular hoods bolted on top of the washer. The water in each compartment was separately contained, without any provision for running the water from one compartment into the next. We found it difficult to remove the last traces of ammonia and at the same time keep a decent strength of liquor. To get over this difficulty we connected each water chamber in series by 1¼-in. pipes, inserting a valve in each pipe. We can now empty the first chamber, then open the valves and let the liquor in the other compartments run backwards until a common level is obtained through the washer; then we run clean water in at the last chamber until all the compartments are raised to proper working level. By this means the last chamber is practically filled with clean water, and all traces of ammonia can be removed, enabling us to get 10 oz. liquor in our first chamber.

We also had trouble with the hoods getting choked, and to cure this we fixed a syphon pipe at one end of the washer, connecting the syphon outlet to each hood by means of a branch tap, on the outlet of which was fitted a **T** piece inserted through the top plate of the hood. Once each week we open each tap in turn, and by means of the syphon pour in about a quart of tar solvent. We find that the gas-ways are kept clear, enabling the washer to be worked for periods of four to five years without having to be cleaned.

Another piece of work we had to do was to increase the size of the connections of the tower scrubber from 8 in. to 12 in. diameter. The top and bottom plates were not sufficiently deep to take a 12-in. flange. To overcome this difficulty we made use of the old 8-in. branches, bolting another 8-in. branch to the opposite side of the scrubber, and connecting to the 12-in. pipe by means of a **T** branch. I think in this instance we have increased the efficiency of the scrubber. The gas enters in two streams, the one playing against the other. This must assist in causing it to spread before coming into contact with the scrubbing materials. With these and other little adaptations we have been able to make our plant manufacture without trouble, and with very efficient results, much more gas than what it was originally designed to make.

To-day our Industry is concentrating on " selling; " and there is no doubt that the efforts of various medium and large undertakings to meet the tariff system of the electricity people by " gas tariffs " and the " block system " of charge are doing good. However, for small works, such methods would present a problem in regard to office staff; and I think a well thought out discount scale of charge would be equally effective, without causing appreciable increase of work in the account keeping.

In Frome we have a good industrial load, and in regulating our scale of charges we range from 5 p.ct. to 25 p.ct. off the ordinary rate of charge, and no meter hire is charged to any consumer. We are also letting out cookers on simple hire, and think that this offers profitable business. We have not commenced the hire-purchase system, but, if a consumer desires it, we arrange extended terms for purchase of gas fires and cookers, which allows a customer to have a better-class article than what we hire out, while we obviate the risk of having the appliance thrown back on our hands through failure to keep up hire-purchase payments.

Competition from Oil.

In the industrial field, oil is a keen competitor. Oil firms are carrying out extensive propaganda, and there is scarcely a gas furnace maker who is not also making oil furnaces. Gas must be sold at anything between 2s. and 3s. per 1000 c.ft. if competition from oil is to be met. The type of gas furnace used needs to be carefully watched, for, if the consumer is not using the correct type, he must be informed of the fact; otherwise the oil people come along quoting their highest efficiency against the lowest figure of efficiency for gas.

Recently I had two experiences with oil competition. A firm in our district using gas furnaces were approached by a furnace manufacturer who told them he had reduced the fuel cost of one of their competitors by 50 p.ct., and, as they were paying 2s. 6d. per 1000 c.ft. for gas, their fuel cost using oil had been reduced to the equivalent of 1s. 3d. per 1000 c.ft. of gas. The first we heard of this matter was a request that we should supply gas at 1s. 3d. per 1000 c.ft., or the transfer would be made to oil. The consumption being a large one, and it being impossible to supply gas at this price, we sought the advice of the B.C.G.A., who promptly put us in touch with an expert on gas furnaces. Inquiries were made, and it was found that the oil conversion quoted by the furnace maker had been made on old-type gas furnaces of the muffle pattern; and if these had been converted to direct-flame furnaces the fuel cost would have been reduced by the same amount as that obtained by the oil furnace, and a furnace much more convenient and clean retained. As our consumer was using the latest pattern gas furnace, it was an easy task to prove to his satisfaction that he had nothing to gain from the adoption of oil; but the danger lies in the way in which a manufacturer, not fully conversant with the latest patterns of furnaces, can be led to believe that he is actually saving 50 p.ct., when the real fact is that he has

been wasting 50 p.ct. before. This emphasizes the importance of the gas supplier keeping in touch with the latest developments, not only in his own line, but in his competitor's line as well.

The second case was where we had a good consumer using a gas engine and also employing gas on a number of small machines. The method adopted in this case was to take the total gas used and calculate it as the cost of running the engine—showing, of course, a fabulous saving by the use of oil. We retained this consumption by separating the two consumptions, and proving that, instead of a saving, there would have been actual loss in the change-over, taking into account the interest on capital charges on the cost of the new installation. Also, by using less gas, the discount rate on the total consumption would have decreased, and the cost of gas to their other machines would have been increased.

The Lighting Load.

The lighting load constitutes a most difficult problem in certain classes of businesses and houses, and for a large number of premises electricity gets the field whatever the price of gas. The appointment of a Committee to consider the whole question as to design and efficiency of apparatus is a step in the right direction, for we are all aware of the importance of trying to retain the lighting load.

Almost every works of any size now possesses some scheme of maintenance for cleaning of burners, but there remains the old complaint that gas dirties the ceiling. Though really this is a fault which proves the hygienic advantages obtained in a gas-lighted room, it is the reason most often given for the adoption of electric light by many people. It appears to me that, if it were possible to combine lighting and heating apparatus so as to enable the fumes to be taken out of the room by other means than passing through the porous ceiling, we should have done something which would give gas lighting a definite advantage over electricity.

Another feature is lighting the air-tight shop window; here again, opportunity occurs for a form of lighting which would retain the light inside the window, the air inlet for combustion and the spent fumes outlet being taken outside. This would possess great advantages over electricity, for it would prevent the steaming of windows, which is one of the disadvantages of electrically lighted shops. Such problems as these are material for enterprising juniors to devise means of developing gas for lighting.

The address was well received, and a vote of thanks was proposed by Mr. B. F. Harris and seconded by Mr. J. T. Spencer.

Tea was afterwards provided through the courtesy of the Frome Gas Company. Mr. Marsden proposed a vote of thanks to Messrs. Cockeys and the Frome Gas Company for the enjoyable afternoon. Mr. J. Button, who is a Director of both Companies, responded on behalf of the Gas Company, and Mr. W. Roger on behalf of Messrs. Cockeys.

The President expressed pleasure in welcoming Mr. James Taylor, of Weston-super-Mare, whose name had been added to the roll of Hon. Members. Mr. Taylor suitably replied.

Annual Meeting.

After the minutes of last meeting were read and confirmed, the President announced that Mr. S. Hole (Bath) had been elected by the Council as Junior Vice-President for the next session.

The following officers were re-elected:

Hon. Secretary.—Mr. W. M. Paterson (Bath).

Hon. Treasurer.—Mr. E. Evans (Gloucester).

Hon. Auditors.—Mr. F. J. Marlow (Weston-super-Mare) and Mr. A. W. Randall (Stroud).

The following new members of Council were elected by ballot: Messrs. C. Bateman (Bath), A. Marsden (Bristol), and J. E. Akroyd (Swindon).

The Hon. Secretary's report, which was taken as read, stated that the membership had increased during the session to a total of 94.

The Hon. Treasurer's report was adopted.

The President stated that arrangements had been made to hold the Summer Meeting at Exmouth, an invitation having been received from the Exmouth Gas Company to visit their works. He also made a strong appeal for papers to be read at the Association meetings.

Not so Bad as it Appears

Gas-workers giving first aid to a motor cyclist after a supposed crash. This photograph was taken during the South Metropolitan Gas Company's Ambulance Competitions at the Co-Partners' Institute, East Greenwich.

Eastern Counties Association at Wisbech

PRESIDENTIAL ADDRESS OF MR. J. GREEN.—COAL HANDLING PLANT AT CAMBRIDGE

Members of the Eastern Counties Gas Managers' Association were assembled in gratifying numbers on Thursday and Friday last for the 81st half-yearly meeting, which was presided over by Mr. J. Green, A.M.I.Mech.E., who is Engineer and Manager both to the Wisbech Lighting Company and to the Wisbech Water-Works Company. Wisbech is an ancient and modern town, with peculiar attractions for the historian and the horticulturist. It has distinguished itself by various achievements in the past, and it did so in the warmth of its welcome to the visitors on this occasion.

The Gas-Works.

The Chairman of the Lighting Company (Mr. G. S. Gardiner) was present to welcome the members on the Thursday morning at the gas-works, which were inspected under the guidance of the President. Like the town, the gas undertaking has a long and interesting history. In 1832, as the result of correspondence which had taken place between the Corporation of Wisbech and Mr. Malam, of Holmpton, Yorkshire (an engineer of eminence, who had lighted Kingston-upon-Hull and other populous places), a contract for the supply of gas to Wisbech was entered into with Mr. Malam. The foundation stone of the gas-works was laid in the same year; and Mr. George Marshall was the Resident Manager. In 1857 Mr. Malam intimated that it was his intention to construct new gas-works, and a year later (in view of the expiration of the contract in the following year) a meeting was held at the Town Hall, at which it was decided that, instead of renewing the arrangement, a Gas Company should be formed and application made to Parliament for the necessary powers. The Corporation intimated its intention to give every support to the project, and one effect was the immediate reduction by Mr. Malam of the price of gas, accompanied by an intimation of his intention to persist in his own application to Parliament for further powers. In 1859, before a House of Lords Committee, it was arranged that the new Company should purchase Mr. Malam's works at a valuation.

The Company proved an exceedingly remunerative undertaking for its promoters, under the guidance of the Chairman (Mr. George Dawbarn) and Mr. William Horsely, who was the first Manager. During 1893, 29,885,000 c.ft. of gas were made, 2926 tons of coal carbonized, the total receipts from the sale of gas and residuals being £7493 and the total expenditure £5704. Private consumers to the number of 833 took 23,232,000 c.ft. of gas, and the 338 public lamps consumed 4,521,000 c.ft. Mr. R. J. Sharman was Manager from 1879 to 1903, and Mr. J. G. Hawkins from then until 1919, when Mr. Green succeeded him. During the time Mr. Green has been with the Company, he has re-modelled the whole of the works plant.

In 1925 the carbonizing plant had a total maximum capacity of 400,000 c.ft. per day, and consisted of a horizontal retort house, a Tully plant, and an "Adaptable" intermittent vertical retort plant. In 1926 it was decided to extend the carbonizing plant; and after making a study of various types, it was arranged to install a bench of Woodall-Duckham continuous vertical retorts, capable of producing 470,000 c.ft. per day. There is one bench containing six retorts, heated by means of two producers placed at one end of the bench on the retort house floor level. Coal is brought in railway wagons and discharged by hand into a small receiving hopper, from which it is fed into a breaker. The feeder is fitted with a screen through which the small coal by-passes the breaker. The broken coal, mixed with the small coal, is fed into a bucket elevator, and is delivered therefrom into overhead storage hoppers of 48 hours' capacity. A waste-heat boiler has been installed. It is of the vertical fire-tube type, and is arranged to work under natural draught.

There were many other interesting features to be investigated, but as these were subsequently dealt with by the President in his address, readers may be referred thereto. Mention must, however, be made here to the new waterless ("M.A.N.") holder erected by Messrs. R. & J. Dempster. This is of 750,000 c.ft. capacity, and it has given complete satisfaction during the time (some five months) that it has been in operation. Here are a few of the constructional details: The holder is polygonal in shape, having fourteen sides. There are 52 tiers of side plates extending from the base to the lower edge of the roof lights. The diameter is 87 ft., and the height from foundation to eaves of roof is 148 ft. 3½ in. The whole structure is designed to withstand a wind pressure of 40 lbs. per sq. ft., so as to provide a factor of safety of four. The tar pumping plant consists of six self-contained protected electrically driven pumps, fitted with automatic control. The electric current is produced on the works by two sets of totally enclosed vertical high-speed steam engines, direct coupled to totally enclosed 6 KW. dynamos at 220 volts.

Following the business meeting, it was arranged, through the kindness of the County Surveyor (Mr. R. S. W. Perkins) to give a demonstration, on the Sutton Road, of the latest tar spraying plant by Messrs. Johnson Bros. In this connection, it may be mentioned that there is at the gas-works a "T.I.C." lead bath type tar plant, equipped with Wickner still, and special mixing tank (with pump), for providing road tar.

For dealing with the coke, there is a belt-driven Cort cutting machine, with elevator for filling rail trucks.

Showrooms.

The Company, in conjunction with the water-works Company, have just opened new showrooms and offices, which are prominently situated in the Market Place, and these

the members were afforded an opportunity of inspecting. The lighting arrangements are all controlled by switches, and Sugg's ventilating lamps are fitted throughout, with "Nautilus" flues. Provision is also made for ventilating other appliances by "Nautilus" blocks from any of the three floors. The second floor is fitted up for demonstration purposes.

Luncheon.

After the works inspection, members and guests to the number of more than one hundred repaired to the Rose and Crown Hotel, where they were the guests at luncheon of the Chairman and Directors of the Wisbech Lighting Company, with Mr. Gardiner presiding.

The toast of "The Wisbech Lighting Company" was submitted by Mr. Thomas Glover, C.B.E., M.Inst.C.E., who eloquently voiced the indebtedness of the Association to the Company for their hospitality and for allowing them to see how the President carried on his work. It was, he thought, a pity that gas and water were not more often found under one management, because the two had many things in common, and each was out to serve the public with a necessity of life. They wished the Company continued prosperity.

Mr. Gardiner, responding, mentioned that his grandfather was one of the original shareholders in the Company, and following that his father was a Director, and afterwards Vice-Chairman. It was due to a loss sustained by the Company little more than a year ago that it had fallen to his lot to take the chair on the present occasion; for he followed Mr. Oldham, who was enthusiastic in matters concerning the Gas Industry. It was under Mr. Oldham's Chairmanship that Mr. Green had carried out the improvements at the gas-works; and they were now reaping in all departments the benefit of this outlay. Their President had tackled a difficult task with great perseverance.

The next toast—"The Town and Trade of Wisbech"—was submitted by Mr. F. Prentice, in an interesting and inspiring speech. He congratulated the Gas and Water Companies in having as Engineer Mr. Green, whose great ability was only equalled by a modesty which was as rare as it was becoming. The Town Clerk (Mr. F. W. Coulam), in his reply, assured those present that he knew of no desire on the part of the Town Council to oust the gentlemen who were at present looking so well after the public interests.

Mr. Collins Clayton, J.P. (who is Chairman of the Water Company and Deputy-Chairman of the Gas Company), proposing "The Eastern Counties Gas Managers' Association," said it had been a great pleasure to the Directors to welcome the members that day. They fully appreciated all that Mr. Green had done for the Companies and for the town. In addition to his ability as an Engineer, the President had a happy way of managing the staff.

The President, in the course of his reply, remarked that it might quite rightly be said that this was an age of associations of various kinds, and he agreed with those who were inclined to think that it was perhaps a little overdone; but it would be proved that this Association filled a real want. There could be little doubt of its practical usefulness, and he would like now to pay his tribute of appreciation of the benefit that he had received from being a member. At the meetings, they pooled their ideas and experience in regard to the daily working of their own undertakings; and this was very necessary in these days of keen competition. He was proud to hold the position of President, and thanked the members who had given him their support. It was very re-assuring that they could report a steady increase in membership.

The final toast was "Our Visitors and the Press," which was submitted in felicitous terms by Mr. W. R. Girling, a Director of the Lighting Company.

Dr. E. W. Smith, C.B.E., who replied, said it was significant that, at a time when it was too generally supposed gas lighting was defunct, the undertaking there should be known as the Wisbech Lighting Company. It was not only a relic, but a prophecy. Gas was still the most popular form of lighting for the masses of the people; but apart from that, the energy of the Engineer and the staff had been such that at least 50 p.ct. of the public lighting had been retained, and any factory lighting there was no doubt would be mainly by gas. There was no justification for any fear that street lighting, factory lighting, and lighting for the masses would not to a very great extent be retained by gas. Mr. Green's Board should be extraordinarily proud of the condition of the gas-works. It was not unusual to see well ordered gas-works, but Wisbech stood exceptionally high in this respect. The arrangements for the meeting, too, had been excellent, and in this connection much help had been given by one of the President's colleagues, Mr. Barry.

Business Meeting.

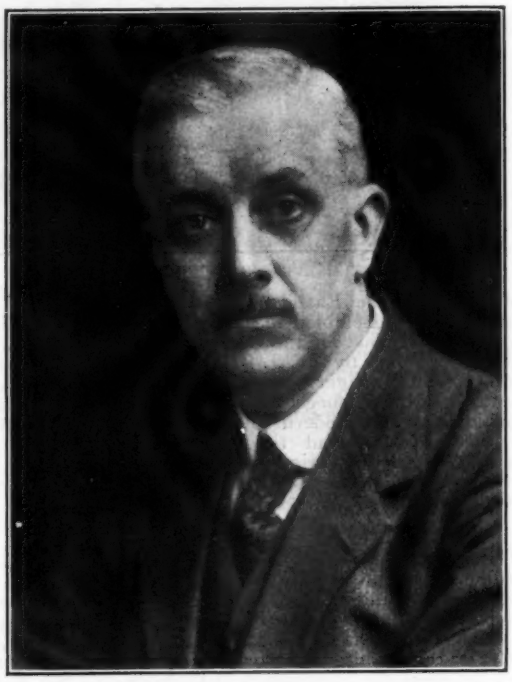
On assembling in the afternoon at the Town Hall for the business proceedings, the members received a hearty welcome from the Mayor (Mr. E. J. Sandall); and this was followed by the confirmation of the minutes of the last meeting, and by a few announcements.

The Hon. Secretary (Mr. E. F. Keable, of Southtown) said a year ago a letter of sympathy had been addressed to Mr. E. W. Smith, of Chelmsford. Since then Mr. Smith had passed away, and a wreath had been sent on behalf of the Association.

The President remarked that Mr. Smith had been an active member, and they regretted his passing. He asked the members to rise, as a token of respect and sympathy.

The Hon. Secretary announced the receipt from Mr. Ronald Glover, on behalf of the family, of a letter expressing appreciation of the Association's sympathy on the death of Mr. Samuel Glover. He added that Mr. Hansford had been under an operation, and though better now he was not well enough to travel.

The President extended congratulations to two members—to Mr. J. H. Troughton upon his election as Chairman of the Newmarket Gas Company, and to Mr. P. D. Walmsley, who had been honoured with a seat as Managing-Director on the Board of the Great Yarmouth Gas Company.



THE PRESIDENT,

J. Green, A.M.I.Mech.E., M.Inst.Gas E., Engineer and Manager to the Wisbech Lighting Company and Wisbech Water Works Company.

Mr. Green received his technical education at the Municipal Technical School, Oldham, and holds Honours Certificates in Gas Engineering and Gas Supply. He served under the late Mr. M. Flegg, of Redcar, Mr. W. H. Bennett, of Redhill, and Mr. R. W. Edwards, of Aldershot. Mr. Green was appointed to his present position in 1919.

President's Medal.

The President next presented to Mr. A. Gregory the President's Medal. He spoke of the happy time at Harwich under Mr. Gregory's Presidency.

Mr. Gregory, returning thanks, said the medal would remind him of a very pleasant year of office.

The resignation was announced of Mr. J. A. Hornby, of Grays.

New Members.

The following new members were elected, on the proposition of Mr. W. Grogono, seconded by Mr. P. D. Walmsley:

Mr. W. J. Sandeman, Croydon.
Mr. J. Kennington, Grimsby.
Mr. W. Fisher, London.
Mr. W. D. Crick, Southwold.
Mr. I. Marsden, Alford.

Report and Balance-Sheet.

The President remarked that the balance in hand was £44 9s. 6d. The President's Benevolent Fund (founded by Mr. W. Jones) showed a balance in hand of £82 16s. 3d. So far no calls had been made upon it. The Committee recommended that a grant of £5 5s. be made to the Benevolent Fund of the Institution of Gas Engineers.

The report and balance-sheet were adopted, on the proposition of Mr. J. H. Troughton, seconded by Mr. W. C. Chapman.

PRESIDENTIAL ADDRESS

Of Mr. J. Green, Engineer and Manager of the Wisbech Lighting Company.

My first duty is to thank you again for the honour that you conferred upon me in electing me to the Presidency of this Association.

I should also like to pay tribute to my late Chairman, Mr. F. Oldham, by whose interest and encouragement I have been able to obtain this position, and also to thank my present Chairman, Mr. G. F. Gardiner, and Directors, without whose co-operation I could not have accepted.

When I first became acquainted with Wisbech I found that it was given in some directories as a port, and it may be of interest just to mention the part that Wisbech has played in the past as a centre for the distribution of coals to several gas undertakings in the neighbourhood. I have obtained the following information from an old resident of Wisbech, one of our esteemed consumers.

In the year 1850 and until railway companies' conveyance was more suitable, large quantities of coal were conveyed by waterways to the following gas-works: Cambridge, Woodstone, Ramsey, and Whittlesea. The amounts contracted for would be approximately 10,000 tons per year, and the agreement would be made between the late Richard Young and Isaac Collett, the bargee.

The late Richard Young imported the coal by ship *ex* Newcastle and Seaham to Wisbech Port, and it was thence conveyed to the various gas-works mentioned. Richard Young was five times Mayor of Wisbech from 1858 to 1863, and also High Sheriff for London.

A true story is related about a gang of barges loaded with coal at Cambridge. Lying in the middle of river, these barges obstructed the course for the following day's boat race. The bargee was asked to move further up the river, but declined to do so, claiming the right of the navigation, although he had been offered good compensation from College "grads." This greatly annoyed the "grads," who, in mischief or revenge, arranged with a certain boat builder to bore holes into the barges overnight. Thus were they sunk, and the waterway was cleared for the race.

Although a port, Wisbech cannot lay claim to having any industry other than that appertaining to agriculture and fruit growing, and our sales depend mainly upon domestic consumption.

The first gas-works was erected on the north side of the river in 1832, and was privately owned. The present site was chosen in 1857, and a Company formed under the name of the Wisbech Gas Light and Coke Company. In 1879 additional Parliamentary powers were obtained, and the title was changed to that of the Wisbech Lighting Company. In keeping with most other towns, the Gas Undertaking has developed from an annual make of 3,500,000 c.ft. in 1832, selling at 15s. per 1000 c.ft., to 101 millions in 1930, with the price of gas at 4s. 9d. per 1000 c.ft.

When I took over the management in 1919 the full effects of the war were greatly in evidence, and I was confronted with the rather formidable task of reconstruction with the disadvantage of high costs ruling for all commodities. In the period under review the whole of the plant has been remodelled, a great portion of the work having been carried out by our own labour.

The size of the works is not large enough to carry a technical staff enjoyed by our larger undertakings, nor can I show you anything outstanding; but I would like to say how I have appreciated the benefits received from such meetings as this, held at more important centres, thus justifying, if it be necessary, the need and usefulness of our Association.

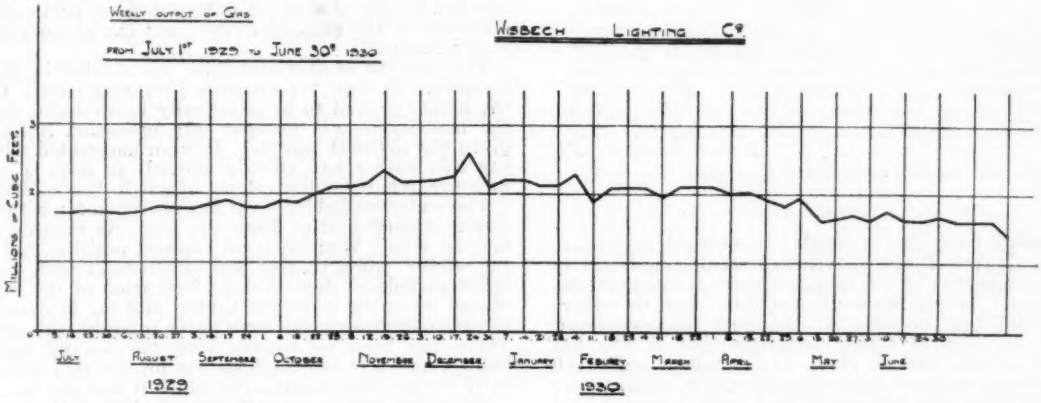
With this introduction I cannot do better than give you a brief outline of what has been done, and the efforts that are being made, with a progressive Board and loyal staff, to carry on, endeavouring by good service to uphold the prestige of the industry which we are proud to serve.

New Carbonizing Plant.

The subject of the most suitable type of carbonizing plant to suit any particular undertaking is always one of fascinating interest. To review the results of several years' working on one's choice of carbonizing plant is of even more interest and education.

At Wisbech the problem of new carbonizing plant had to be faced in 1926, so that to-day one can review the results of four years' working. The decision to install continuous verticals appeared to offer advantages over the existing practice and over competing forms of carbonization. These advantages were, briefly, increased yield of gas and bye-products, increased output of gas on the same ground space, maximum flexibility of output, lower labour costs and easier condition of operation, constant calorific value and specific gravity of the gas, and a coke specially suitable for the domestic market. These factors in the long run would lead to a reduction in the price of gas into holder. As a consequence an installation of Woodall-Duckham continuous vertical retorts was erected, and has now been at work for over four years.

There is one bench comprising six 53-in. retorts heated by two producers at floor level. The construction of the Woodall-Duckham retort is too well known to need detailed description here, but one or two points may be referred to. As each retort is absolutely separate from the next, it can be heated up and cooled down without in any way affecting the others. This feature enables the variations in the weekly output, which may be seen by reference to the accompanying graph, to be met by having three, four, or five retorts at work without upsetting the general carbonizing results.



The retort faces and combustion chambers are constructed of high-quality silica. Fears are often expressed as to the suitability of this material for coping with the cooling-down and heating-up of retorts required to meet the exigencies of the variation in demand for gas; but the experience at Wisbech has not indicated any difficulties in this direction. The retorts have required practically no maintenance during the four years they have been at work.

Coke Handling Plant.

The coke handling plant, while simple, can be claimed to be effective. For dealing with the coke required for the producers, the coke skins, which are side discharging, after being filled with coke direct from the retorts are elevated to the producer charging platform by means of a steam-driven lift. The surplus coke may be either run out into the yard in barrows or taken in the side-discharging skips by means of the lift to the level of the outside coke hoppers. At this level a timber platform fitted with light-steel rails

serves to transfer the skips to the top of the hoppers. Here, the coke is screened on fixed bar screens into two sizes—screened coke and breeze.

It may be mentioned that, for utilizing the major portion of the heat contained in the waste gases after they leave the setting and before they are discharged to atmosphere, a waste-heat boiler has been installed for raising steam at 100 lbs. per sq. in. steam pressure. It is of the vertical fire-tube type and is arranged to work under natural draught.

One benefit resulting from the introduction of the continuous vertical retort plant has been the elimination of naphthalene troubles on the district. Prior to the starting-up of the new plant, complaints of stoppages due to this substance were regular and in considerable numbers. Within a few months of the inauguration of the continuous vertical plant these had dropped to negligible proportions, and to-day the distributing system can be considered as being free from trouble in this respect. It has been possible to reduce the number of complaints men required on the district.

Reviewing, then, the four years of working of the continuous vertical installation at Wisbech, it can be seen that the advantages which favoured the choice of this type of plant have been realized.

The manufacturing labour cost has been more than halved, resulting in a saving of about £1200 per year, or 0·6d. per therm sold. The increased gas make per ton has enabled an increased demand of about 11 p.ct. to be met with an increased coal requirement of only about 5 p.ct. The resultant saving is of the order of 0·35d. per therm. Maintenance has been practically negligible. Apart from re-lining the producers, £10 has been spent in the four years on odd material for maintenance.

With a continuous yearly increase in our gas output, the inadequacy of holder capacity (which I refer to later) became more acute, making it very difficult to work the plant efficiently. With the completion of the new holder, I feel sure that the working results for the present year will be very close to those of 1927, after four years' continuous working of the plant.

For comparison I give the working results as follows:

	Horizontal Plant.		Vertical Plant.
	1919.	1926.	1927.
Coal carbonized, tons	7,146	6,895	6,431
Gas made, c.ft.	78,868,000	88,950,000	96,950,000
Gas made per ton, c.ft.	11,036	13,085	15,066
Calorific value, average	No record	490	520
Therms per ton	,, ,,	64	78·3
Net coke from retort house, cwt.	7·7	9·6	10·3
Tar, galls.	9·4	10·7	11·4

The coal used being all South Yorkshire.

Coke.

In changing from the horizontal to vertical retorts we experienced (what I had rather expected) complaints in regard to the quality of the coke. A general comment was that we were "taking too much out of it," and that there was some difficulty in using it. To meet this complaint, and with the idea of trying to prove that it was not warranted, a coke cutting plant was installed, and small graded samples in paper bags of about 28-lbs. weight were delivered to those who had complained, with a request that it should be given a further trial. These sample bags were also displayed in our showrooms and advertised in the local Press. Advantage was also taken to sell them at the Water Company's boosting stations situated in the country.

The results have been very satisfactory, and quite a new business began to develop, for after a few weeks we found it necessary to order the bags by the 1000, and during the first six months we were selling at the rate of 1000 bags per week. With very few exceptions we have got back our old consumers, and the quality and dryness of the coke are now fully appreciated.

We are rather proud of the fact that we have been supplying for several years the Royal Estate at Sandringham, which I think you will pardon me for mentioning.

The importance of our coke business cannot in my opinion be too strongly emphasized, seeing the great part it plays in regulating the price of our other commodities; and it is very gratifying to know that all progressive undertakings are giving it serious attention.

The paper given by Dr. Lander at the British Industries Fair, on Fuel Problems, is to me a great tonic from the point of view of coke alone—not to mention the other problems he so ably dealt with. And if our Industry will attempt to follow the lines he suggests, there is indeed a bright future before us.

To mention one feature alone—the capture of a small portion of the fuel for domestic use (estimated at 34 million tons of coal) is sufficient to give some stimulus, not to mention the public service that we should be doing by bringing about a cleaner atmosphere.

Tar.

In regard to tar, we also found some difficulty with the change in our carbonizing plant, and I feel in duty bound to give credit to Messrs. Woodall-Duckham for their assistance in overcoming it.

An old de-hydrating plant, which had served previously, was replaced by a "T.I.C.;" but even this would not produce the desired quality. The problem was taken up by Messrs. Woodall-Duckham, who submitted drawings for an addition to the plant in the form of a mixing tank and pump. This was fabricated from old material on hand, and provided a means of blending the lighter oils with the heavier residues. The plant was then put to work under the supervision of their Chemical Staff, and road tar produced conforming to the British Standard Specification for a No. 1 Tar. Since then we have disposed of our tar to the local Surveyor, as before.

Sulphate of Ammonia.

Sulphate of ammonia, I know, is not at the present moment a very happy subject for us. Up to the time of dismantling our old plant, we had been most fortunate in disposing of all our sulphate to a local manure manufacturer—certainly with very little profit, but happily without loss. When the plant is remodelled, I have hopes that we shall continue to dispose of sulphate locally, as we propose to produce neutral salt.

Holders.

I have just referred to the lack of holder capacity, which has been one of my greatest difficulties; for prior to the completion of the new waterless, the available storage to give requisite pressure was equivalent to only four hours' supply. A decision had to be made as to the type of holder to be erected, and the deciding factors in favour of the waterless gasholder were:

(1) Adequate and constant pressure.
(2) Absence of boosting.
(3) A drier gas from the outlet of the holder.

We hoped the claims for this type of holder would be justified by the absence of water troubles, particularly the corrosion in the gasholder cups, and the absence of ice in frosty weather.

The erection of this gasholder was started in May, and completed in time for Christmas requirements. On test, the holder proved to be practically bottle-tight, and from the moment it was brought into operation it has never given the slightest trouble. It is an undoubted advantage (as this holder has already proved) to have a constant pressure, whatever the volume of gas in the holder.

The waterless holder itself has provision for withdrawing water of condensation from the gas. As regards the formation of ice, Wisbech is an exposed position, but during the winter, when trouble was experienced with ice in the other gasholder, there was no indication of the formation of any ice in the waterless holder, and the heating coils in the tar collecting tanks were never brought into operation. There has been no trouble with the sealing tar in the holder, and a recent analysis has proved that it is practically in the same condition in which it was put in.

There has been practically no variation in the running of the pumps since the holder was put to work, and each pump runs on an average about four times a week, each run being of about two to three minutes' duration. The amount of current therefore used by these pumps, which are only of 1 H.P. each, is very small, and the current is supplied by a small dynamo and steam engine, which are in duplicate. The number of pump runs is really very small, and during the winter, as an experiment, the dynamos were stopped. Once a day the attendant went into the holder, and if the seal needed any additional tar, the pumps were allowed to run; but when no tar was necessary, the holder continued to work without any pump runs for another day.

The supervision of the holder has proved a very small item; and so that the attendant should get thoroughly accustomed to the working of the holder, he has made his observations once a day, but no part of the mechanism has needed any re-adjustment, so that this observation is really no more than is given to any part of the works plant, and has not entailed any additional labour.

No attempt has been made to give elaborate details of the construction and working of this gasholder. The holder is there for inspection, and a large number of detailed drawings are also available. Apart from this, the holder has only been in operation about five months; but if the holder continues to work as it has done (and there appears to be no reason why it should not work perfectly satisfactorily), there will be no cause for complaint; rather

there will be satisfaction that this type of holder was chosen.

We have no gas drying plant, but since the waterless holder was brought into use the amount of water pumped from the district syphons has been reduced far beyond what I expected. One of the largest syphons on our 12-in. trunk main usually gave from 40 to 60 gallons in from three to four months, but on our last visit only 6 gallons of water was obtained, and in most other cases our man was surprised to find the syphons blowing gas.

There is also much to be said for the constant pressure from the manufacturing side, as well as the distribution, for it assists very materially in maintaining a consistent pull on the exhauster. There may be conflicting opinion regarding the æsthetic point of view, but, as a local architect remarked to me, from an engineering point there is much to commend the waterless holder.

Distribution.

Although the engineering and chemical side of the Industry appeals most strongly to myself, I am fully alive to the importance of the selling side of our business. Salesmanship has been written large during the past few years, and it would be foolish to ignore or belittle its importance. It may not be out of place at this juncture to give due credit to that Association of which, I am sure, we as an Industry are proud. I refer, of course, to the B.C.G.A.; and if I may, as your President, I should like to congratulate its Executive Chairman on the well-deserved honour that His Majesty has conferred upon him, reflecting, as it does, to the credit of our Industry generally.

In supporting this most useful Association I do not mean that it should be expected to do the whole of our advertising, or conduct our salesmanship, for these can only be effective in the ratio as we ourselves carry on, aided by the propaganda which the B.C.G.A. initiates. Another agency to which I feel we are greatly indebted is our Technical Press. I am sure you will agree that not only are we well served by technical articles, but also greatly encouraged by the splendid lead they give us.

"Service" is the slogan we adopted several years ago, and we do our utmost to carry it out. For several years we have had a "free" maintenance scheme for lighting burners, making regular calls on all consumers who care to take advantage, and charging for material only, selling mantles, burners at the very lowest price, with the object of letting the consumers have the benefit of only the best materials. At the present time we have over 200 consumers on our list.

A progressive policy in respect of the purchase and fixing of all kinds of appliances is also being actively carried out. Any kind of gas-using apparatus we are prepared to let out on hire-purchase terms, and cookers and fires on simple hire. We allow a discount of 22½ p.ct. for gas used for power purposes, and a special discount for fried fish ranges; and I am hopeful that I shall soon obtain the sanction of my Board to adopt a sliding-scale of charges for all gas consumed or—if legislation is forthcoming to rid our Industry of its ancient shackles—adopt some of our competitors' methods of charging, without, however, some of their glaring inconsistencies.

During the past year we made a total increase of 185 new consumers—169 slot and 16 quarterly meters—and fixed the following additional apparatus: Cookers, 317; gas fires, 201; radiators, 12; geysers, 10; coppers, 56; rings, 91; irons, 16; lamps, 27; "Sunhot" water heaters, 1; "Wonder" washers, 1; and grillers, 1.

A policy upon which I personally am very definite is that only the most efficient apparatus shall be fixed; and we are scrapping all old unpacked cookers, and supplying on hire those sufficiently packed. This has resulted in a very much reduced consumption of gas, to the advantage of the consumer, amounting in some cases to as much as 50 p.ct. For some time this resulted in our sales remaining stationary, or slightly decreasing, despite the fact that we were adding many new consumers; but we have now more than overcome this, and on the first quarter of this year our sales of gas are up by nearly 10 p.ct.

Some may not agree with this, but I am convinced that it is a sound policy, for if you can prove to your consumers that you are out to give value for money you are laying a sure foundation for future business—not to mention the pleasure you have in receiving letters and personal thanks from those who previously were disgruntled consumers.

Efficient apparatus and good service on the distribution side is, however, only part of the business, and, without a consistent quality and pressure of gas, is, to say the least, not complete service.

This Company was among the first to adopt the therm method of charging early in 1921, and, as I have mentioned, the state of the carbonizing plant was very bad. Hence it was deemed advisable to declare a value of 480 B.Th.U. With this quality, however, some difficulties were experienced owing to small mains; also, the limitations of the holder pressures, and complaints were found to be materially reduced by maintaining a quality of from 500 to 520 B.Th.U. With the introduction of the vertical plant, this quality was adopted.

Consistent quality and pressure is now our constant aim, and it is very gratifying to know that our consumers appreciate it—which, I think you will agree, is real compensation for the service rendered.

Competition.

Wisbech is supplied by electricity from a local generating station owned by a London Company. It commenced operation in 1914, and, like most other electrical concerns, has various tariffs. It has secured about half the street lighting, and most of the shop window illumination.

My Board made a strong bid for the lighting of the new bridge recently opened; and our scheme was actually adopted by the Lighting Committee. But at a later meeting of the Town Council it was turned down for what was described as the more "modern" illuminant. Here, to my mind, is the "keynote" of our difficulties in competition with our rival. Electricity, to the average individual, is the alpha and omega of all things at the present time, and it must be granted that our competitor has many advantages; but if wiser counsels could prevail, however, I am inclined to say that co-operation rather than competition would be to the mutual benefit of both industries.

Lighting Load.

I am with those who are alive to the importance of the lighting load; and we spare no pains in our efforts to hold our own in this part of our business. A few months ago we commenced to advertise and to fix at cost price the latest type of switch controls, and the response has been encouraging. What we are hoping may soon be a practical proposition is the self-lighting burner so long promised, eliminating the troublesome by-pass and giving us what will undoubtedly be a strong weapon in helping us to maintain and increase our lighting load, particularly with the poorer class of consumers, who fully appreciate the heating benefit that accompanies gas lighting.

The Water-Works.

Seeing that my duties are divided between the Lighting Company and the Water Works, it may not seem out of place to say a word about the Water Undertaking over which I hope to have the pleasure of conducting you tomorrow. The area supplied by this Company is very extensive, covering approximately 250 square miles, in which there are some 48 parishes, and supplying a population of some 68,000 people.

The advantages of dual management are perhaps worthy of mentioning, as they are very real in our case, having regard to the size of the undertakings. In the case of main extensions, when in the area of gas supply, it is often possible to lay the two mains together, and also the services, in one operation of trenching. It also has the advantage of utilizing labour to greater efficiency, particularly to meet emergencies. Transport can also be used more efficiently. It is, however, perhaps most pronounced as regards office staff and collecting, where the dual duties are easily combined.

Considerable development has taken place during the past eleven years, and I give a comparison of the working results:

Comparison of Working Details—1919-1930.

—	1919.	1930.
Water delivered	254,330,000 galls.	398,749,000 galls.
Analyses of consumption—		
Domestic (estimated)	125,260,000 ,,	254,622,000 ,,
Bulk supplies (metered)	28,924,000 ,,	27,335,000 ,,
Public conveniences, Unions, schools, &c.	5,980,000 ,,	9,447,000 ,,
Agriculture (estimated)	3,000,000 ,,	6,500,000 ,,
Industrial (metered)	91,166,000 ,,	100,845,000 ,,
Fuel used	896 tons	937 tons
Consumers	9,261	12,300
Total revenue	£14,656	£23,115

Conclusion.

The Industry we serve is an old one, and has passed through many vicissitudes. To my mind it has never been in a stronger position than to-day, but this position can only be held if those who, like ourselves, are engaged in controlling its destinies see that the motto of our Chartered Institution—"*Assidue exquirendo servire*"—is carried out in its fullest sense.

Mr. F. Prentice, proposing a hearty vote of thanks to the President for his address, said the keynote of all that

Mr. Green had done was "Progress." He had been particularly interested to note that the President had followed somewhat in the steps of Ipswich. In 1913 they installed a Woodall-Duckham plant at Ipswich. He still had it in its improved form, and was entirely satisfied with it. It was highly creditable to the President that, in a small town of somewhere about 10,000 people, he should have gone in for a plant of the same type. Mr. Green not only had a vertical retort plant, but he had a waste-heat boiler. They had not had one very long at Ipswich, but he calculated that in a year-and-a-half he had saved about £4000. As the boiler cost £3500, they were now going to reap the benefit of it. As members were aware, the waterless holder at Ipswich was the first erected in this country. Mr. Green had seen the advantage of it, and he had also provided himself with one. This was greatly to his credit, and he had had his reward, because he said it had never given the slightest trouble. If this experience was the same as the rather more lengthy one at Ipswich, it never would give any serious trouble. There was an enormous gain with this type of holder, on the ground of pressure alone. When it was right down, and there was only a plate left, it gave rather more pressure than when full, which was the opposite to what prevailed with the ordinary holder.

In his opinion, went on Mr. Prentice, gas companies at the present time, whatever else they did, should see, during this period of comparative quiet, that their plant was put in apple-pie order, particularly in the distribution department. They might not always be in the position they were now. There were parts of the country in which 45 p.ct. of the workmen in the town were on the dole. The trouble had touched even some of their eastern districts, and it was a very grave position. Sooner or later the storm would burst, and then those who had their works right up to date and their distribution systems in first-class condition would be very much more likely to weather it than those who had allowed things to slide.

Mr. J. W. AUCHTERLONIE seconded the vote, which he thought was thoroughly well deserved. It was always a difficulty to prepare a Presidential Address, but Mr. Green was fortunate in having so much new matter to introduce. What he had told them showed that he was a very busy man indeed. With regard to the activities of the B.C.G.A., he agreed that it was advantageous to advertise locally as well as nationally.

The PRESIDENT having acknowledged the vote, the following paper was read:

COAL HANDLING PLANT CONSTRUCTION AT CAMBRIDGE GAS COMPANY'S SIDINGS.

By H. R. THOMAS, Assoc.M.Inst.Gas E., Assistant Manager, Cambridge University and Town Gas Light Company.

In response to Mr. Keable's request for a paper dealing with some recent sphere of work at Cambridge, I have pleasure in describing recent alterations which have been made to our railway sidings.

The gas-works are situated approximately 400 yards from the Cambridge-Norwich main railway line on the Newmarket Road, and were built before the railway was introduced. They extend back from the road to the Halingway of the River Cam, and were not designed for the use of a railway running through them, with the result that we have our siding in Coldham's Lane branching off the main railway line, as near as possible to the works.

It had been desirable for some years past to enlarge the siding and construct a mechanical coal handling plant, but owing to extensions which had to be carried out at the works, the alterations were postponed until such time as was convenient.

The old siding occupied an area of about 1 acre, and was very congested, containing only two lines of metals of very small radius curves and having a capacity for about forty 12-ton wagons. All the material—namely, coal, coke, oxide, light oils, &c., had to be unloaded and loaded by manual labour. It was eventually decided to purchase adjoining land to the siding, and another 1½ acres were added.

COMPLETE RECONSTRUCTION.

Our scheme was for a complete reconstruction of the siding, embodying new track with curves of 4-chain radius, which are necessary when dealing with coal wagons having a capacity of 20 tons. This type of wagon, I venture to think, will be generally adopted in the future. A loading bank accessible by an incline from the roadway in the siding for the loading into wagons of coke, spent oxide, and other material was also included.

Before this loading bank could be constructed a reinforced concrete retaining wall had to be built. This slopes from 3 ft. above ground level to 11 ft. at the top for a distance of approximately 165 ft. It then continues at the 11 ft. height for another 100 ft., terminating in a return end for the width of the road, which is approximately 30 ft. The other side of the bank is the natural angle of repose of the earth with which the bank was made. The gradient to the loading bank is about 1 in 16, and easily mounted by motor and other vehicles. We find this bank exceedingly useful for loading light oils into rail tank cars, as it now discharges from the road tanks by gravity, whereas previously this material had to be pumped. For loading coke, &c., a portable steel chute is used which allows the material to be tipped direct into the railway wagons.

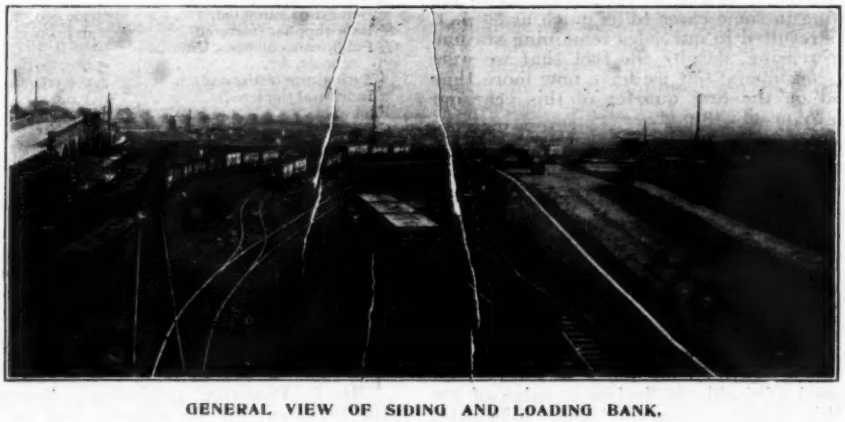
A truck weighbridge of 30 tons capacity was included in the scheme, and a coal handling plant consisting of a rotary tippler, breaker, elevator, and overhead storage hoppers with bottom discharge doors for the rapid loading of steam road wagons. A shunting locomotive, a gas engine for driving the coal handling plant, together with the necessary buildings, comprised the remainder of the plant.

The new siding is about three times as large as the original one, now spreading over approximately 3 acres. We have two entrances from the main line, and this allows empty wagons to leave by one and full ones to enter by the other. There is also a special line running alongside the loading bank. There are also two entrances from the road, and our steam road wagons enter through the lower entrance, load from the hopper, and leave by the nearer one to the works.

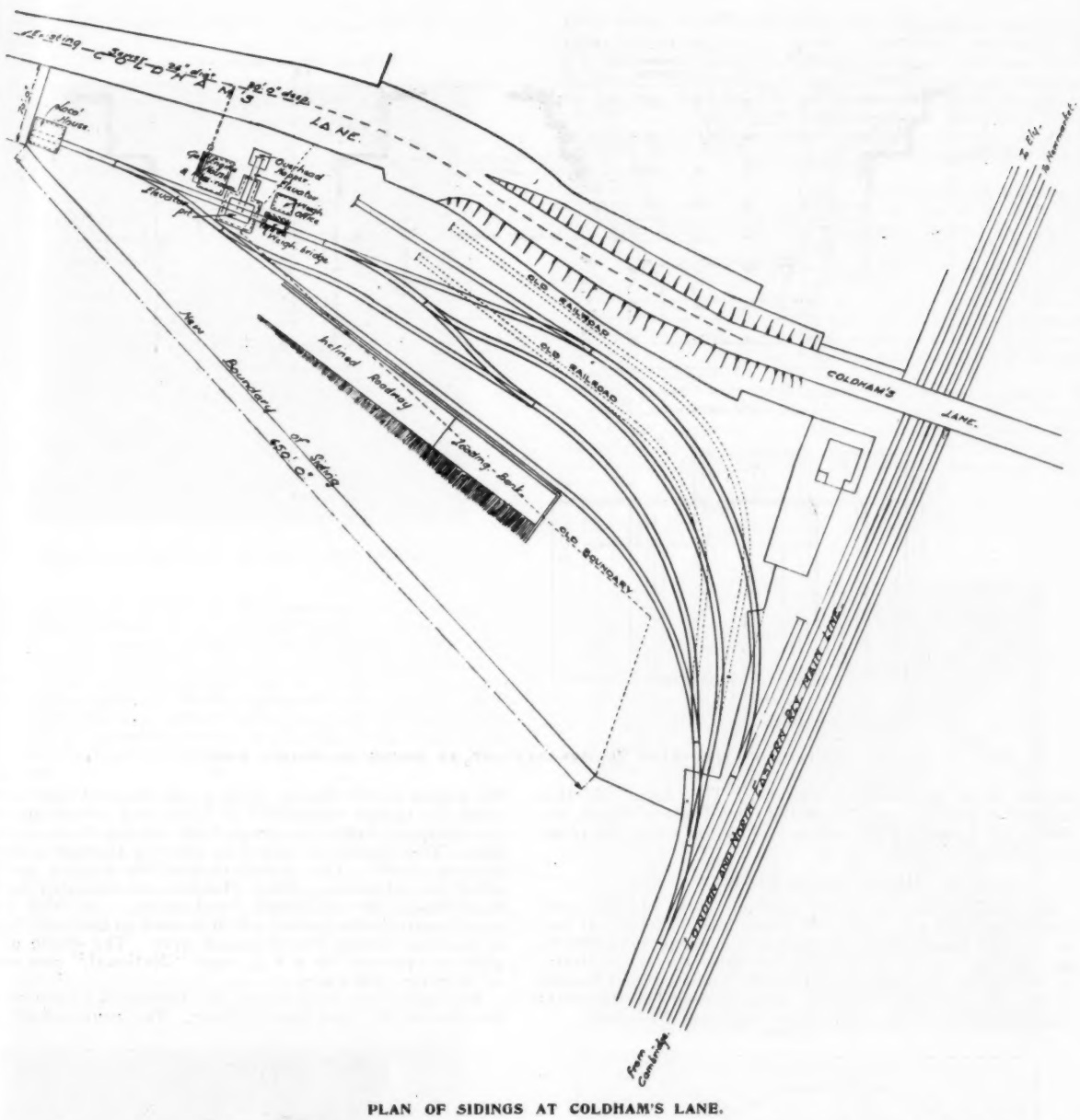
The railway track is 85 lbs. per yard British Standard Section bulb head rails of 4 ft. 8½ in. gauge. All the curves have a radius of 4 chains, allowing an easy sweep for the shunting operations. Points and crossings have been included so that the whole of the lines can be utilized for either full or empty wagons as required. The siding will now hold 60 wagons of 20 tons capacity or 80 of 12 tons capacity. A new switch was laid by the L. & N.E.R. Company to form the second entrance.

DESCRIPTION OF PLANT.

The coal handling plant, which was manufactured by Messrs. W. J. Jenkins & Co., Ltd., of Retford, has a capacity of 70 tons per hour, with a storage capacity of 50 tons. It consists of a rotary wagon tippler, capable of tipping any size of wagon up to 20 tons, a receiving hopper



GENERAL VIEW OF SIDING AND LOADING BANK.



PLAN OF SIDINGS AT COLDHAM'S LANE.

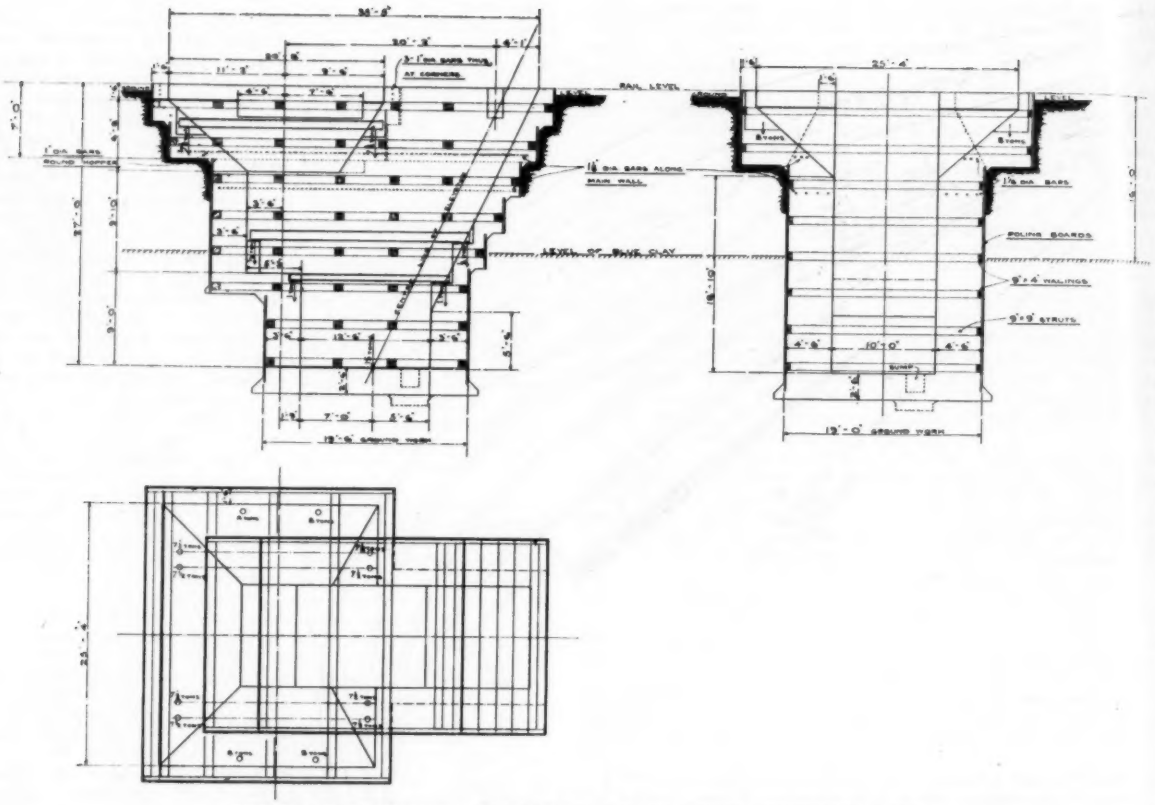
with reciprocating feed into a breaker, an elevator of the chain and bucket type, and storage hopper.

The breaker and elevator pit was constructed by Messrs. R. Robinson & Co., of London, and is of mass concrete walls and reinforced hopper. The depth to floor of pit is 27 ft. below ground level, and the bottom portion is 10 ft. by 12 ft. 6 in. inside measurements. The walls are 4 ft. 6 in. thick on the sides and 3 ft. 6 in. on the ends. A considerable amount of difficulty was experienced during the excavations, due to water being found at a depth of 8 ft., and continuous pumping became necessary.

At about 18 ft. 6 in. deep a land drain was unearthed, passing right across the excavation. The pipes were made of clay, and when they were broken an uninterrupted stream of clear water came from both sides of the break. The rate of flow was measured, and I found it to be round about 200 gallons per hour. We thought this flow of water rather remarkable, as it came from both directions, and did not cease during the whole of the time the pit was being constructed. There is a very deep clay pit within 60 or 70 yards of our excavation, but this did not seem to help in the slightest degree in keeping the water drained. We eventually connected the two ends of the drain by means of iron socket pipes driven into the blue clay and carried round the outside of the walls of the pit. Reinforcing bars of 1¼-in. diameter steel were used in the side walls at the base of the receiving hopper, and around the receiving hopper itself 1-in. diameter bars.

All necessary provision was made in the pit and hopper for steel girders supporting the plant. The bottom cone of the receiving hopper, and the side nearest the elevator, were constructed of mild-steel plates, the other three sides being formed in concrete. The hopper is covered with a 10-in. mesh steel grid. A sliding door operated by rack and pinion is fitted to the outlet of the hopper. Immediately below this a reciprocating feeder, operated by double eccentrics, regulates the flow of large coal into the breaker, from which it passes into the elevator boot. If the coal is small, the breaker can be by-passed. The machine is of the Jeffrey single-roll type, size 24 in. by 24 in., with a capacity of 70 tons to 2½-in. size per hour. The roll is fitted with renewable segments, on to which the claws are cast, and is mounted in a heavy cast-iron frame containing the breaker plate, which is concave in section. This breaker plate, acting in conjunction with the roll, grips the large lumps of coal and reduces it to its finished size in one operation, allowing it to pass between the roll and the plate.

This plate is held in position by two tension rods with heavy springs at the ends. The springs do not move under ordinary working conditions, but when an undue pressure comes on the breaker plate they act as a cushion, giving way slightly. If the cause of the pressure is a piece of iron, for example, becoming wedged in the breaker, wooden pins which are mounted in a separate hub and driven through into the pulley flywheel shear off, and the roll stops before any damage is done. The pulley, however, continues to revolve, and prevents the belt being thrown off. The speed of the roll is 60 r.p.m., which is considerably greater than that of many coal breakers. This type of machine is small for its capacity, and suited our purpose admirably, as we did not wish the excavations to be

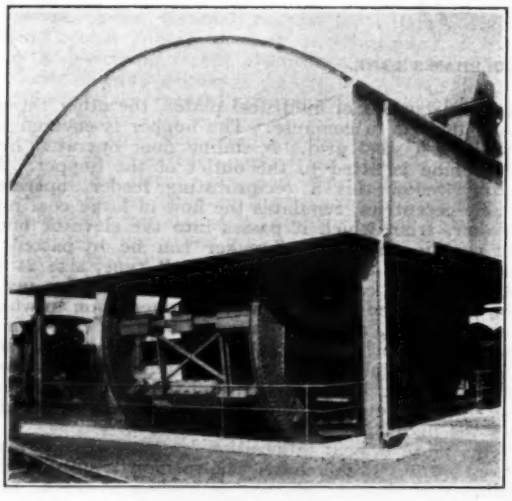


DETAIL OF TIMBERING TO BREAKER PIT AT SIDING—COLDHAM'S LANE.

deeper than absolutely necessary. The drive for this breaker is from a pulley mounted on a friction clutch, enabling the breaker to be put out of action when the plant is handling nut coal.

Elevator and Tippler.

The coal elevator is set at an angle of 65° to the horizontal, and is totally enclosed above ground level. It has an over-all length of 70 ft., and a bucket speed of 100 ft. per minute. At the head of the elevator there is a chute, by which the coal falls into a totally enclosed coal hopper of 50 tons capacity. The hopper is enclosed because of its close proximity to the road, and to prevent coal dust.

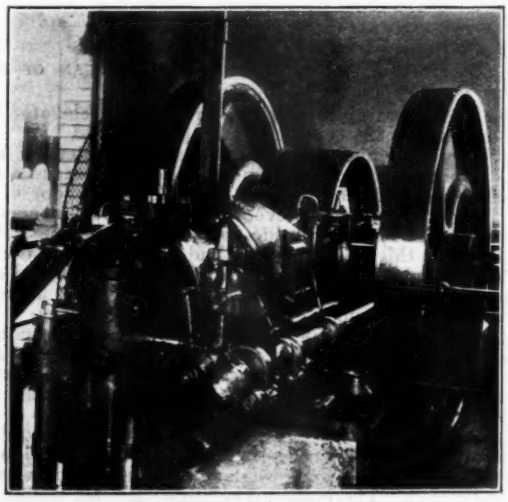


Wagon Tippler.

The rotary tippler is situated immediately above the concrete coal-receiving hopper. This machine is of the double-ring type built of mild-steel sections riveted together and forming a self-contained structure, the rings being supported on rollers, which in turn are mounted on joists built into the concrete walls of the hopper.

The wagon to be tipped is placed in position by the locomotive on a platform supported on two pivots, which allows the wagon to tilt slightly on to a rope-covered side cushion when the tippler commences to rotate and a hand-operated top clamping beam has secured the wagon firmly in position. The tippler is rotated by gearing through a double friction clutch. One clutch is used for tipping and the other for returning. These clutches are operated by two handwheels through small bevel gears. A third handwheel controls the brake, which is used to hold the tippler in position during the changing over. The whole of the plant is operated by a V.L. type "National" gas engine of 54 B.H.P., 230 r.p.m.

The main drive is by means of a belt on to a countershaft fitted with fast and loose pulleys. The countershaft con-



"National" Gas Engine for Driving Plant.

tains pulleys from which the coal breaker, elevator, and feeder are driven. The elevator drive consists of belt to countershaft, and from there a bushed roller chain drive on to spur gearing and elevator headshaft.

Weighbridge.

A 30-ton weighbridge, manufactured by Messrs. H. Pooley, Ltd., is situated before the coal plant, enabling all

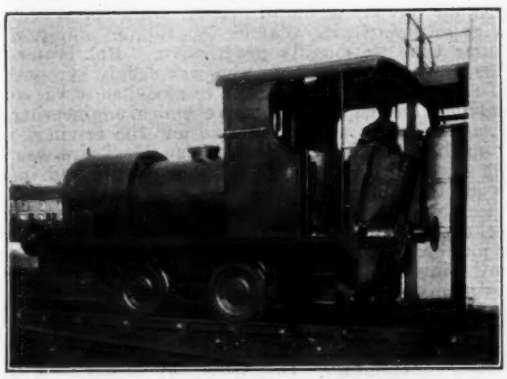
wagons to be weighed before entering and after leaving the tippler.

Weighing Machine Steelyard, showing Ticket Stamping Device.

An interesting feature of this machine is a printing device which stamps on a card the gross and tare of all wagons. The type is raised on the underside of the steelyard, and in whatever position the balancing weight is put a record of that position can be made by inserting a ticket and gripping a handle underneath the weight. This brings the ticket in contact with the type, and the weight is recorded. Another feature is that the knife edges below ground are all protected from rain water and are enclosed in grease.

Locomotive.

When we regarded the question of the locomotive for shunting purposes, petrol, oil, and steam types were considered, but it was decided to adopt steam, with the result that an order was placed with the Sentinel Waggon Works, Ltd., of Shrewsbury, for one of their "Sentinel" B.E. type industrial locomotives. This machine has several



"Sentinel" B.E. Type Industrial Locomotive.

novel and interesting features. The boiler is vertical and situated in the driver's cab, and is of the patent "Super-Sentinel" type with corrugated firebox, into which water tubes are expanded. The firebox is bolted in place, and can readily be detached for cleaning, leaving every part of the water space easily visible and accessible for cleaning. A superheater is fitted above the water tubes. The boiler has a working pressure of 275 lbs. per sq. in., and coke is used as fuel.

The engine is mounted in the front of the locomotive, and between the engine and the cab is a water tank of 300 gallons capacity. The engine is placed vertically, and has two cylinders, 6¾ in. bore by 9 in. stroke. The steam and exhaust valves are operated by push rods from two camshafts running in the crank chamber and provided with adjustable tappets. The camshaft allows the steam to be cut off at 75 p.ct. of the stroke for starting and very heavy work, and at 30 p.ct. for ordinary running.

The whole of the connecting rods, crankshaft and camshafts, timing gears, and water pump drive, run in an oil bath and are completely protected from dust and grit. The engine will develop 88 B.H.P. continuously at a steam consumption of 20 lbs. per B.H.P., and is capable of pulling seven or eight loaded 12-ton coal wagons. The drive from the engine is by means of a 2½-in. pitch roller chain to the front axle, and the two axles are coupled by another 2½-in. roller chain.

Suitable brick buildings have been erected for accommodating the weighbridge, gas engine, and locomotive. The gas engine house has an overhead floor, reached by outside staircase, which is used as a mess room, with lavatory accommodation adjoining for the workmen engaged at the siding. Good supplies of hot and cold water are available, and there are a gas cooker and a gas fire in the mess room.

It has been found that two men are sufficient to operate this plant—one to drive the locomotive and do all shunting, and the other to weigh the wagons, and operate the tippler and other parts of the plant.

All the coal is now conveyed broken from the siding to the works by two "Sentinel" steam wagons of 5 and 6 tons capacity, and the occasional assistance of a 2-ton tipping petrol lorry on Saturday mornings. All coal for allotment to the retort houses or storage is again weighed at the works.

The two "Sentinel" wagons can each do four loaded journeys per hour, making a total of approximately 44 tons

"Sentinel" Wagon Loading from Hopper.

if required, and these two vehicles can cope with the present requirements.

I am sure that a few remarks will serve to show how well this type of transport is suited to the conditions required. Both our "Sentinels" have proved to be exceedingly economical to run. The older of the two wagons has been running continuously since 1919. During that time the engine has never been dismantled, and the condition of the pistons and connecting rod bearings does not show need for attention up to the present. The annual overhaul, which takes place in the summer, occupying two to three weeks, includes boiler inspection, changing of all boiler fittings (a spare set is fitted), inspection of engine glands, push rods for operating valves, and a few minor repairs such as renewal of firebars and stoking chutes. The latest wagon is a "Super-Sentinel." It has a greater carrying capacity than the old one, and has been in use since 1929. Both wagons are fitted with tipping bodies, operated hydraulically. The "Super-Sentinel" is arranged to give both side and end tip as required.

The figures given below are representative of the plant working at its full capacity, and represent the costs for handling.

	Pence per Ton.
Cost of shunting wagons with locomotive	0·50
,, weighing, tipping, breaking, and elevating .	1·07
,, loading from hopper and conveying to works	1·41
Total	2·98

In conclusion, my thanks are due to Mr. Auchterlonie

GENERAL VIEW OF PLANT FROM LOADING BANK.

for his permission to describe the plant and to make use of the photographs.

Mr. A. GREGORY proposed a hearty vote of thanks to Mr. Thomas for his paper, into which, he said, a great deal of work must have been put. They were indebted to the author for the trouble he had taken. It was very nice to see the younger members of the industry coming forward with papers, and they hoped to have further contributions of the same kind in the future.

Mr. W. J. MASON, seconding, remarked that the work described was a great credit to the Cambridge Gas Company.

Mr. AUCHTERLONIE, in support, said it was thought that an account of this plant would make an interesting contribution. The question of handling coal was a rather difficult one, and he was not quite sure whether the Cambridge plant was not as convenient as some with a railway running right into the works. There was great flexibility in being able to tip coal at any part of the works by means of these wagons.

Mr. P. D. WALMSLEY also supported the vote, which was carried with acclamation.

EDUCATION COMMITTEE'S REPORT.

The HON. SECRETARY read the following report of the Education Committee:

The Committee present to the members of the Eastern Counties Gas Managers' Association their annual report. As in the previous year a number of students have sought and received advice and help, but the numbers are very small indeed considering the size of the district, and this point was referred to at your Autumn Meeting. As you are aware, the Committee sent out in May last a circular letter and questionnaire, with the hope of stimulating a wider interest in the scheme.

The replies were very disappointing, and, as the letter referred to was the second to be sent since the inception of the Committee, it must be concluded that the youths and pupils we are hoping to reach either do not exist or are already qualified.

Students from the following towns have been accepted for this year's examinations—viz.:

Gas Engineering	..	Ordinary	..	Colchester	.. One
,, ,,	..	Higher	..	Newark	.. ,,
,, ,,	..	,,	..	Retford	.. ,,
,, Supply	..	Ordinary	..	Gt. Yarmouth	.. ,,

Gas Fitting Classes have again been well attended, and exist in the following places: Norwich, Cambridge, Ipswich, Colchester, and Great Yarmouth with Gorleston. Next session it it hoped to establish a class at Bedford.

This year four men at Cambridge will be taking the final examination. The Committee wish again to thank the tutors of these classes, the Gas Companies who have been generous in their provision of accommodation, plant, tools, &c., for the practical work, and also the Education Authorities in the towns named for their continued and valued help, for without their aid the classes could not be carried on. The Secretary has kept in close touch with the needs of students by attendance at the Gas Education Committee meetings in London.

The need for fully trained employees is daily growing, and it is hoped that, in addition to the work already in hand, engineers and managers will give the new Scheme for the Education and Training of Gas Salesmen their fullest possible consideration, and assist their staffs as far as they are able.

The steady increase in the intensity of competition in these days, alike with electricity and with oil, the complete disappearance of the times, which will never return, when an increase in the sale of gas could be relied upon without any serious effort being made to secure it, the obvious need of skilled planning, direction, and execution of continuous selling campaigns and maintenance schemes necessitate beyond any question the employment by every gas undertaking of staff competent to meet that competition and to carry out such a progressive policy in the most efficient manner possible.

Signed on behalf of the Committee.

A. GREGORY, *Chairman.*

E. F. KEABLE, *Hon. Secretary and Treasurer.*

Mr. WALMSLEY moved the adoption of the report, with the remark that the work involved a great amount of time and sacrifice on the part of the Secretary. He would, therefore, like to couple with his proposition a hearty vote of thanks to the Secretary for his services.

Mr. T. V. JOHNS seconded the motion, which was carried.

It was agreed that the next meeting of the Association should take place in London.

ANNUAL DINNER.

In the evening, members and guests met again at the Rose and Crown Hotel for the annual dinner of the Association, under the presidency of Mr. GREEN.

Once more the toast of "The Town and Trade of Wisbech" was submitted, this time by Mr. J. W. SCOTT, who, in the course of a particularly apt speech, declared that they would all carry away with them happy memories of their stay in the town. The MAYOR suitably replied.

Dr. E. W. SMITH proposed "The Wisbech Lighting Company," and said that everything had been done that could be done to make the visit and the meeting thoroughly enjoyable. The success had been due to the keenness of the Engineer, Mr. Green, backed up by an energetic Board of Directors. Mr. Green was to be congratulated on his good fortune on having a Board which, while possessing the capacity to understand what he was talking about, was at the same time thoroughly progressive. But better than all this, he had a Chairman who was deeply sympathetic. He (Dr. Smith) had never seen a re-modelled works as well re-modelled, and with such a high chemical engineering standard, as the works which they had had the privilege of inspecting that morning. ["Hear, hear."] There was some "grey matter" in every part of the plant, and in later years all that they had done would prove to have been well worth while. The President was preparing for the future, and his work would mean that the price of gas would later on come down.

Continuing, Dr. Smith referred to the difficulty of getting young men to-day to enter the Gas Industry. He said it was worthy of consideration as to why young men did not feel disposed to spend years of their lives preparing to take posts as gas engineers. There might be many reasons, but two were outstanding. One was that young men to-day were not well enough paid when they were prepared to enter the Industry, and they knew that if they were prepared to go in at low salaries they were not likely later on to get the remuneration which should be paid to men of great experience. Until this state of affairs was altered, and gas engineers were not only paid well but trained well, there would never be suitable attraction for young men to enter the Industry. The other thing was that in the past the professional standing of gas engineers had not been anything like the status of professional men in other industries with equal qualifications. This was a thing entirely for themselves. They had now a Charter, which was a wonderful step in the direction he was trying to indicate. Those who were controlling the conditions by which membership for the future would be governed were going to be strict about the matter. But he would put it to those present that, until the Institution of Gas Engineers—or better still, until the professional organization which represented those who were working in the Industry, which he did not like to call the Institution of Gas Engineers, because he thought this was a wrong name—until that In-

stitution could include all those who were necessary for the development of the Industry, it would not be anything more than a one-sided affair. This was wrong. The Institution should be an Institution of all those who were necessary for the development of the Industry. To-day the Industry had so developed that the old type of mechanical or civil engineer was no longer so essential. Specialists were developing gas drying, ammonia scrubbing, benzole washing, carbonization, holder design, and so on. Life would be too short for each engineer to start developing everything for himself. What they wanted to-day were qualified men who were capable of getting the best out of the plant which was placed at their disposal. They must be a combination of good engineers and good chemists. It was just as necessary to have good technical men on the selling side. Those who were engaged in dealing with the gas after it left the holder were as necessary to the Industry as those who could produce good gas. They should, therefore, be represented in the Technical Institution of the Gas Industry, which might be called anything, so long as it was not labelled by one particular branch. Prejudice should be cut out, and the matter looked at broadly.

Mr. GARDINER, who replied, said that the Industry had a wonderful record for not letting consumers down.

The remaining toasts were: "The Visitors and the Press," submitted by Mr. PRENTICE, and acknowledged by Mr. A. R. KELSEY, of the Board of Education; and the "Eastern Counties Gas Managers' Association," proposed by Councillor W. V. FUNDREY, and responded to by Mr. WALMSLEY, who expressed the opinion that their Association was the most homely and most sociable one in the country.

Before separating, the health of the President was enthusiastically drunk.

AT THE WATER-WORKS.

On the Friday morning all who could remain assembled at the showrooms, from which they were taken for an inspection of the works of the Wisbech Water Company. After a drive of 4 miles, there was a pause at Friday Bridge, to see the water tower and reservoir; and then the journey was resumed to the springs at Marham, 22 miles away. Here luncheon was served in a marquee, and the gratitude of those present to all who had contributed to their comfort and enjoyment was voiced by Mr. Auchterlonie, and acknowledged by Mr. Collins Clayton, the Chairman of the Water Company.

Some of the members extended the tour to King's Lynn, while others returned to Wisbech—one and all delighted with the welcome and hospitality that had been extended to them in connection with their visit to Wisbech.

The Chemical Constitution of Coal

At the May monthly meeting of the London Section of the Society of Chemical Industry—Prof. G. T. Morgan, F.R.S., presiding—it was announced that Dr. G. W. Monier-Williams has been elected Chairman of the Section in succession to Prof. Morgan. The new members of the Committee are Dr. J. J. Fox and Messrs. E. T. Brewis and C. E. Sage. On the motion of Mr. W. J. A. Butterfield, a cordial vote of thanks was passed to Prof. Morgan for his work as Chairman of the Section during the past two years. At the same time he was congratulated on being President-designate of the Society of Chemical Industry.

Prof. W. A. BONE, F.R.S., then gave a lecture on "The Chemical Constitution of Coal," and said he wished to emphasize the point he had made when addressing the Section on the same subject six years ago—viz., that the whole subject of coal must be treated as a problem of organic chemistry. At the same time, he proposed to review the results of some recent research work which has thrown new light on the chemical constitution of coal.

Although for nearly two hundred years our industrial civilization has been based mainly on coal, we still know less about its chemical nature than about that of any other natural raw material. Up to the end of the last century chemists mostly ignored it, probably on account of its complexity, but to-day such an attitude is impossible, and it is high time organic chemists bestirred themselves and tackled, systematically, the constitution of coal, as they have done in the case of other natural organic products. Incidentally, Prof. Bone said he preferred to call the macroscopic constituents of coal by their proper English names, and could not help feeling that the substitution of vitrain or clarain for bright coal, durain for dull coal, or fusain for mineral charcoal has tended to mistify plain things and to make believe that somehow or other coal is better explained thereby.

Hitherto the experimental methods employed in the study of coal have involved either the thermal decomposition of the coal substance or its extraction by some selected sequence or combination of solvents or some chemical attack upon it. The thermal decomposition of coals up to temperatures of 1000° C., or thereabouts, is too brutal a method to be of much use to the chemist. The extraction of coals with various solvents gives valuable information in certain directions, but it leaves the main coal substance untouched. Long ago, after thorough investigation, he discarded the use of pyridine, and although perhaps no solvent extraction of coal is entirely unimpeachable, he had found that boiling benzene, at pressures up to 700 lbs. per sq. in., is by far the best method. The extract so obtained can be resolved by suitable after-treatment into several different fractions, nearly all of which have quite distinctive chemical characteristics.

In the case of bituminous coals, for instance, four such fractions are obtainable—viz., (1) a yellow brown viscous non-nitrogenous neutral oil of vaseline-like constitution; (2) a reddish-brown solid with softening point usually below 60° C.; (3) a non-nitrogenous reddish-brown brittle resinous solid, softening usually below 150° C.; and (4) a neutral, amorphous cinnamon-brown nitrogenous powder, softening only at temperatures above 150° C. and undoubtedly of a benzenoid nature. It can be said that fractions (1), (3), and (4) comprise a single type of chemically distinct substance. Fraction (2) appears to be less distinctive and more valuable than the other three. It can be said from this work upon bituminous coal that the coking propensities are directly related to its yield of fraction (4). The maturer, semi-bituminous, and anthracite coals yield little or no benzene-pressure extract, and they appear to have lost any coking properties which formerly they might have possessed, presumably through the seams having been affected by heat due either to neighbouring igneous intrusion or to friction caused by earth movements.

BENZENE PRESSURE EXTRACTION.

On examining the original benzene-pressure extract from immature earthy brown coals from Australia, Canada, and elsewhere, it was found that while they contained substances corresponding with fractions (1) and (2) of bituminous coals, fractions (3) and (4) were missing; and in their place there appeared both phenolic and other soluble complex acidic bodies and esters, as well as small quantities of ether-insoluble bodies whose nature have not yet been precisely determined. From the phenolic portions, phenol, p-cresol, and catechol have been isolated, and probably more complex phenolic bodies are present also, as possibly other acidic bodies which have yet to be investigated.

Discussing the benzenoid character of the main coal substance, Prof. Bone said a chemical study of the structure of the residue after benzene pressure extraction is as important as an investigation of the origin and character of the coking constituents of the coal, and although it has taken some years to work out, methods have been devised for the complete investigation of the complex mixture of crystalline acids resulting from the oxidation, and it is remarkable that the oxidation products of Australian Morwell brown coal, Canadian Estevan brown lignite, and Durham "busty" coking coal—so different in age and origin—contain no fewer than eight different carboxylic acids in common, and that no fewer than ten out of the twelve possible benzene carboxylic acids are isolated from one of these coals. No acid containing more than one benzene ring is ever isolated, and, taking these facts, in conjunction with the data for the crude acids—other than acetic, oxalic, and succinic acids—he felt justified in labelling them benzenoid acids. It has been found, however, that the oxidation of the coal substance to such crystalline benzenoid acids takes place through the intermediate formation of colloidal humic acids, and there are grounds also for suspecting the successive formation of other and as yet unisolated crystalline acids.

It can be claimed, said Prof. Bone, that these researches not only afford the first unimpeachable quantitative evidence that in the great part the main coal substance has a benzenoid constitution, but they establish new experimental methods and technique for the exploration of the vast new field opened up. The significance of this work has been realized abroad, and German investigators, using nitric acid, have obtained similar results and are following hard on our heels.

In conclusion, Prof. Bone would not venture to construct

any model of the coal molecule, because as yet there is not sufficient evidence; but it is obvious that this work would keep a staff of organic chemists fully employed for many years to come. Hitherto he had been indebted to the Department of Scientific and Industrial Research for annual grants which enable the employment of three research chemists on the work. In view, however, of the importance of this work to our sorely distressed coal industry, he wished to see his staff and resources doubled. He could not help feeling that had a tithe of the money expended upon low-temperature carbonization and the like been devoted to fundamental researches upon coal and its industrial application, our country would not be in its present unhappy predicament.

Discussion.

The CHAIRMAN said that after the comments of Prof. Bone he was almost ashamed to say that work was being done at Teddington on the products of low-temperature carbonization. Personally, he felt there was room for all. The work done at Teddington was on low-temperature tar, and he had found in it exactly the same substance that Prof. Bone had found in the raw coal itself. This work had been done since Prof. Bone's and it had not yet been published, and it was one of the things which had puzzled him. He used to think that the resins were brought over on carbonization, but he was now inclined to the view that these resins were formed by the polymerization of unstable substances which originally came over on distillation and had undergone resinification since. In any case, they gave rise to the products which Prof. Bone had found in the original coal substance, which was a highly significant coincidence, if nothing else.

Dr. R. LESSING said the great difficulty in this matter was that primary chemical compounds were not amenable to chemical explanation, and that was the reason why, in spite of the considerable amount of work done during the past 20 or 30 years, they had made such little progress. The methods adopted by Prof. Bone and others really only dealt with the fringe, so to speak, of the undecomposed molecules present in the coal. The main body of the coal—about 85 p.ct.—was not dealt with at all. Perhaps there was a little danger of exaggerating the possibility of there being a benzenoid structure. The work of Prof. Bone indicated that only about 48 p.ct. of the residue, after extraction, was really converted into benzenoid acids. There was, therefore, an enormous field for research yet which was entirely chemically unexplored, because at the moment the chemical nature of the ulmins was a closed book.

Dr. F. S. SINNATT (Fuel Research Station) said the work of Prof. Bone was being followed up at the Fuel Research Station where the hydrogenation of coal was being studied systematically, and results obtained were fairly parallel with those obtained by Prof. Bone. For instance, a Yorkshire coal had been hydrogenated, and 47 p.ct. of the weight of the coal was obtained as hydrocarbon oil which would boil below 230° C.; this oil contained 41 p.ct. of its weight as aromatic hydrocarbons. A considerable proportion was hydrogenated aromatics and naphthas, but the actual proportion in the case of this particular investigation had not been ascertained.

Prof. BONE, replying to the discussion, again said he objected to the invention of fancy names for the constituents of coal, and preferred to have plain English terms which could be understood by everybody. He claimed that the work he had described broke new ground because it brought out the carbon balance of the oxidation, a thing that had not been done before. At the same time, it was necessary to be a little cautious in stating any conclusions at the present stage. In the experiments, as far as they had gone, it seemed that the major portion of bituminous coal had a benzenoid structure. It might turn out from evidence that was being collected—and which would shortly be ready for publication—that this progressively increased as the coals mature.

The meeting terminated with a hearty vote of thanks to Prof. Bone.

Midland Junior Gas Association

Annual Meeting

The Annual Meeting of this Junior Gas Association was held at the Birmingham Council House on Thursday, May 7—Mr. W. MACNAUGHTON presiding.

The annual report (which was approved on the motion of Mr. F. A. C. Pykett) recorded a steady growth in membership and a marked increase in attendances at both meetings and works visits. Twenty-one new members were admitted, and there were three resignations, the membership being 284.

In the Institution of Gas Engineers' Examinations members were again successful as would be seen from the following: Gas Engineering, Diploma, 2; Gas Engineering, Higher Grade, 4; Gas Engineering, Ordinary Grade, 5; Gas Supply, Higher Grade, 2. Of the three Diplomas awarded last year, two were to members of their own Association, the third going to Scotland.

The following were again elected *en bloc* to serve on the Midland District Education Committee: Messrs. H. R. Hems, W. Macnaughton, R. G. Marsh, and W. L. S. Spinks. Mr. W. J. Pickering continued to represent the Junior Associations on the Executive Committee of the General Education Committee, and to all these gentlemen were due the thanks of the Association.

The Council was pleased to announce an offer by Mr. R. J. Milbourne, Assoc.M.Inst.C.E., M.Inst.Gas E., of Wellington, Salop, to provide annually a Medal, to be called the Milbourne Medal, to be awarded to the member reading to a meeting of the Association what was adjudged to be the best paper. Adjudication would be left to a gentleman connected with the Industry, and their first President—Major F. J. Bywater, of Newcastle-on-Tyne—had consented to undertake that duty.

Fitting reference was made to the loss of two honorary members by the death of Lord Brotherton of Wakefield and of Mr. John Foster, of Birmingham. Both took a keen interest in the welfare of the Association.

NEW OFFICERS.

Mr. W. L. S. Spinks, the Senior Vice-President, becomes the new President; and Mr. F. A. C. Pykett, of Coventry, the Senior Vice-President. On the recommendation of the Council, Mr. S. K. Hawthorn (Birmingham) was elected Junior Vice-President.

The retiring members of the Council—Messrs. W. E. Cadwallader (Birmingham) and F. A. Jenkins (Leamington)—were thanked for their services; and the vacancies were filled by Mr. R. L. Greaves (Wolverhampton) and Mr. E. T. Pickering (Birmingham).

To the retiring officers—Mr. H. C. Wills, Hon. Secretary, Mr. F. A. Grant, Assistant Hon. Secretary, Mr. Geo. W. Smith, Hon. Treasurer, and Mr. W. P. Timbrell, Hon. Auditor—a vote of thanks was passed, and they were unanimously re-elected.

The members of the Midland District Education Committee were re-elected, and due acknowledgment was made of their work, and also that of Mr. W. J. Pickering, a representative of the Junior Associations on the General Education Committee.

REPAIRS, MAINTENANCE, AND CONSTRUCTION OF INDUSTRIAL HEATING APPARATUS.

By F. L. ATKIN, A.M.I.Mech.E., Industrial Section, Birmingham Gas Department.

Considering two main competitive fuels of gas, in the one case the B.Th.U. are expensive to buy, but can be used very efficiently; and in the other case the B.Th.U. are cheap, but they can only be applied efficiently with some difficulty. Gas represents a happy medium, enabling one to use a reasonably priced fuel in an efficient manner at low capital cost for plant.

These notes give briefly a few considerations, mainly from a practical point of view, collected over a number of years' observation and experience of some 400 repairs, &c., in which are included the following: New floors and settings, 120; complete re-building, 170; and reconstruction with improvements, 30. Both natural-draught and air-blast furnaces were dealt with, including the following special types: Hot brass stamping, 13; aluminium holding pots, 12; cyanide and salt baths, 6; potato crisp boilers, 6; varnish and oil holes, 27; brick surrounds for tanks, 10; not classified, 62.

It is proposed to divide industrial apparatus into two groups:

(1) Apparatus for working temperatures up to 550° C.

(2) Apparatus for working temperatures of over 550° C.

These groups will, generally speaking, separate apparatus into two classes—those which do not, and those which do, incorporate a certain amount of refractory material in their construction. The first group is not the primary

object of this paper, but the author does not wish to convey the impression that this class of appliance is unimportant.

Furnaces for Working Temperatures of over 550° C.

These comprise such types as annealing, re-heating, hardening, carburizing, and melting furnaces, together with a number of special-purpose furnaces. These are usually constructed of refractory materials in a metal casing. Repairs which have to be carried out are one or more of the following, given in the order of their more frequent occurrence:

(1) Replacements of the floor, guard tiles, and supports.
(2) As above, *plus* new air tiles and supports.
(3) As above, *plus* new burner bricks.
(4) Complete re-build.

In practice the arch is usually in fairly good condition, but as its thrust and weight is partly taken on the side walls, it is necessary, when new side walls are required, completely to re-build the arch.

An interesting exception is when a furnace is installed alongside a forge or stamping press. The continued vibration and jolting of the press shakes the jointing material from between the arch bricks, and this loosens the arch. This is a particularly bad point in connection with hot brass stamping furnaces (it applies, of course, to all hot brass stamping furnaces, gas-fired or otherwise), as the small pieces of firebrick and fireclay drop on to the billets, and in subsequent stamping operations are driven into the surface of the metal by the stamping dies. This is a definite disadvantage, because, as the stampings are usually machined afterwards, these small pieces of firebrick ruin the cutting tools, which are often expensive.

The replacement of the arch with a flat burr or thick tile does not always represent a solution to the problem, the vibration still breaking up the tile, although success has been achieved by using a special refractory material.

Repairs.

The chief causes of the need for repairs to furnaces are as follows:

(1) Mechanical wear and tear of the floor.
(2) Choking of the gas ports and combustion chambers by iron scale and its subsequent product, slag.
(3) Disintegration and spalling of the brickwork surface.
(4) Actual fusion of the firebrick.

Wear and tear of the floor tiles is caused by the work carried out in the furnace, such as the abrasive action of the case-hardening boxes or trays used to contain the work to be treated, or of the actual work itself as it is being pulled in and out of the furnace.

The floor may also break mechanically, owing to excessive superficial loading; and it must be remembered that firebrick gradually deteriorates under the influence of time, temperature, and load. The practice of throwing into the furnace drop stampings for normalizing, &c., imposes a severe strain on the furnace floor. Another, but infrequent, cause of the failure of the floor mechanically is a badly designed furnace casing, which moves and bulges, especially the bottom plate, thus upsetting the supports of the floor tiles and causing it to crack.

The second is one of the most serious causes of the need for repair. Generally speaking, case hardening boxes are made of mild steel, which metal is also used for the holding trays for the work to be hardened or annealed. These are naturally badly scaled after they have been in use some time through being continually taken out of the furnace into the air when red hot. When the trays or boxes are replaced in the furnace, the scale immediately cracks and flies off, dropping down the gas ports and resting on the air tiles in the corners of the combustion chambers. Being in one of the hottest zones of the furnace, the iron scale fluxes with the firebrick, and thus deterioration commences. The slag formed has a comparatively low melting-point, and with the addition of further iron scale rapidly becomes troublesome. It runs, and attacks the air tiles, which are often built in the side walls. In any case erosion takes place at this spot, which in the course of time necessitates re-building the side wall and, in consequence, the arch.

Over-aeration aggravates the trouble. In the author's opinion, 90 p.ct. of the gas-fired furnaces which are not subject to scientific control are offenders in this direction. If a restriction is placed in a passage conveying hot gases, the velocity of the gases is momentarily increased, causing over-heating at the point of restriction (providing the channel resumes its normal proportions after the restriction). This occurs when the iron scale and slag restricts the gas ports, and further over-heating causes further slagging and hence further over-heating, and so on, progressively.

Disintegration and spalling of the firebrick are mainly due to the quality of the brick, its suitability or otherwise for the particular purpose in hand, and its juxtaposition in the furnace. Spalling is caused by localized over-heating, due to the temperature gradient throughout the section of the firebrick causing minute cracks and spalling or disintegration of the surface, owing to the unequal expansions and contractions of the firebrick, coupled with the scouring and slagging effect of foreign bodies. The more constant the temperature from the hot face to the cold face, the less the spalling effect; hence the greater life from larger furnaces.

Frequency of Repairs.

From experience there appears to be no direct relationship governing the period of time elapsing before repairs are necessary. The number of hours worked, the weight of work treated, or the amount of gas consumed, appear to have little direct relationship to this time period. The larger the furnaces and the less the furnaces are let down and heated up, the longer the life obtained. The life of a furnace is considerably increased if it is worked by modern methods of control, as compared with rule-of-thumb methods, which still, unfortunately, exist to a large extent.

Refractory Materials.

Regarding refractory materials for gas furnaces, the following is a brief summary of their requirements:

(1) They should withstand the normal working load at the maximum working temperature, with an adequate factor of safety.
(2) They should have as hard a wearing surface as possible.
(3) The thermal conductivity should be high.
(4) The specific heat should be low.
(5) The after contraction or expansion should be as low as possible.
(6) They should be available at an economic price.
(7) They should be true to shape and size.
(8) Where general repairs are undertaken, there should be a large range of different shapes and sizes available for immediate use.

Insulating Materials.

In addition to low thermal conductivity, insulating materials should:

(1) Have high refractoriness.
(2) Have high mechanical strength.
(3) Be available in convenient shapes and sizes.
(4) Not disintegrate, shrink, or "pack" at moderately high temperatures.
(5) Be available at an economic price.

Where cast iron is used it should be good-class Hematite iron (at least 50 p.ct. Hematite).

Modernizing and Improving Existing Equipment.

It is only in recent years that the fuel user has come to realize the economic value of insulation as applied to furnaces, and has been educated into understanding that the first cost of a furnace is not of primary importance. Modern furnaces, general speaking, are more expensive than older types, and one of the chief factors of this increased cost is insulation. When dealing with existing plant, it is often possible to incorporate a certain amount of insulation when re-building such furnaces, either by replacing a certain thickness of firebrick with insulation and firebrick, thus decreasing the thermal capacity, which in certain circumstances is advisable, or alternatively, decreasing the size of the working chamber. An incidental advantage when insulating material is used is to decrease the slope of the temperature gradient throughout the firebrick, thus increasing the life of the brick, since there is less tendency to spall.

There are two main types of insulation:

(1) The diatomaceous type, which is costly to buy, but has a very low thermal conductivity.
(2) A porous refractory brick, which is cheap to buy, but has not the same low thermal conductivity of the diatomaceous type.

Owing to the limited space at the disposal of the small furnace designer, it is usual to apply the diatomaceous type.

Improvements can also be carried out by incorporating refractory materials of high thermal conductivity more suitable to the temperatures and class of work on which the furnace is operating. By incorporating such materials, a long life can be obtained, together with a more even temperature, a lower gas consumption, and quicker heating-up.

In regard to furnace doors, insulation concrete has been used with a large amount of success. This consists usually of an aggregate of small broken pieces of calcined insulating material, which is mixed with a proportion of Portland cement and suitably reinforced.

The older types of oven furnaces were often supplied

without side tiles, and it is an advantage when re-building such furnaces to fit side or guard tiles, to avoid the difficulty of flying scale and the possibility of the work dropping down the gas ports. Other possibilities are governed mainly by local conditions obtaining in the furnaces, such as increasing or decreasing combustion chambers, increasing or decreasing the thickness of the floor tiles, or in some cases revising the method of firing—as for example, for low-temperature work, converting an over-fired furnace to an under-fired one. Of the finer points in furnace construction, one is the rounding-off of sharp edges and the filleting of corners of the combustion space, to give the gas and air a smooth passage, so increasing the gas velocity.

In certain circumstances, particularly in high-temperature work, a recuperator adds to the efficiency of the furnace, and can be occasionally added to existing furnaces without too much alteration. Another great improvement is the provision of automatic temperature control, which has gained rapid popularity recently.

Much can be done by periodical attention to the furnace. Where furnaces are used intermittently and iron scale is prevalent, the furnace floor should be cleaned out each morning before lighting up. Periodically the burners should be cleaned, especially when they are operating under dirty conditions, the dust tending to choke up the air inlets. A furnace floor which has become badly cracked should be replaced immediately. By not doing so, damage is caused underneath the floor, and the air tiles and side walls will then fail quicker than if a new floor was replaced immediately. It is a good plan for a furnace user to take weekly, or even daily, gas consumptions of his furnace, together with the time for heating up; and if this should become abnormal, investigations should be carried out to ascertain the cause.

No hard and fast rules can be applied to industrial heating work; it is essential that each case should be judged entirely according to the particular requirements.

Discussion.

Dr. C. M. Walter (Research Department, Birmingham Gas Department) proposed a vote of thanks to Mr. Atkin for his paper. With industrial gas consumers, he said, the question of "service" was especially important; without service, gas undertakings would not be able to maintain a large portion of their load. When an industrial furnace went wrong it frequently happened that the repair work had to be done quickly, and often it was not convenient for workmen from makers to undertake the job. It therefore became necessary, in many cases, for the gas undertaking to do the work required. In carrying out "maintenance" they in Birmingham had created what might be regarded as a new department. It was not possible to speak in terms of time with regard to the depreciation of furnaces, because of the very different conditions under which they were operated. Fortunately, they were coming to the days of automatic control; and he felt this would do much to solve the problem of repairs.

Mr. F. A. C. Pykett (Coventry) seconded the resolution.

Mr. H. R. Hems (Birmingham), speaking in support, pointed out that repair work was one of the most important of the functions of an industrial section. There were present several members who were making a special study of this work, and the paper would be extremely valuable in enabling them to analyze complaints and to deal with difficulties. Repairs to industrial equipment should be done only by experts. Repair work had frequently to be done to apparatus which, in the ordinary way, would be condemned; but they had to remember that the cost of actual replacement was a serious item to some gas consumers, and that if repairs were not carried out on such equipment the gas undertaking would probably lose a substantial load. There were many cases in which fuels, competitive to gas, could show lower initial costs and lower running costs; but when regard was had to maintenance costs then gas showed a big economic gain. He could quote numerous instances where users, having tried oil and other fuels, had reverted to the use of gas.

Mr. Hine (Coventry) said the use of gas for industrial purposes was only in its infancy in this country. Gas was more pliable than other forms of fuel for most industrial processes. It was, all things considered, more economic in use, and he believed that with effective propaganda the Industry would obtain an enormous amount of business

Mr. L. H. Thomas (Smethwick) asked for information as to refractories which were effective in use in hot brass stamping furnaces. The author suggested that a cracked floor should be replaced, but in his (the speaker's) opinion there were high-temperature cements which would be suitable for patching up cracks, providing that the floor supports were in order.

Mr. Atkin pointed out that the actual repairs to industrial equipment carried out by the Birmingham Gas Department represented only a small proportion of the cases with which they had to deal. They advised on a much greater number. He agreed as to the importance of automatic control; and also that gas scored heavily over other fuels when the question was considered from the point of view of cost of furnace maintenance. He did not encourage the patching of cracks in the floor with fire cements, because of the wear and tear on the floors. He favoured replacing the floor; it was not an expensive matter with floor tiles. The muffle type of furnace could, however, be patched successfully. Silica bricks were of comparatively little use in gas furnace work of a general character.

Legal Intelligence

Clements Gas Consumers.

Judge and Plaintiff's Methods.

A claim brought against Lord Lucan, of Gloucester Place, W., by the Clements Gas Consumers' Association, of Victoria Street, S.W., for £79 14s. 6d. for the supply and fitting of gas fires was dismissed on May 15, at the Westminster County Court, by Judge Sir Alfred Tobin.

Mr. S. H. Levine, for the Association, said that Lord Lucan agreed that gas stoves should be installed in three rooms at his house in Gloucester Place, and when Mr. Clements suggested that similar gas stoves ought to be installed in five other rooms Lord Lucan said that he would consider the matter. After further discussion, Lord Lucan said that he was in a hurry, but Mr. Clements was to carry on the work.

Mr. Clements, in cross-examination by Mr. Blanco White, agreed that in February, 1925, he was charged with some other persons with obtaining money as charitable contributions by fraud and sentenced to two months' hard labour.

In February, 1926, the Gas Light and Coke Company got an injunction against you as Geoffrey Bowen Barry, restraining you from representing that you had any connection with the Company?—Yes, it was by consent. I had no money to fight a big Corporation.

On May 13, 1930, Mr. Clements said, the Gas Light and Coke Company obtained another injunction against him by consent, and he became the Gas Consumers' Association (G. B. Clements).

Mr. Blanco White put it to Mr. Clements that the whole style of his dealing had been designed to lead people to believe that he or his firm was associated with the Gas Light and Coke Company.

Mr. Clements denied this, and said he always stated he was of the Gas Consumers' Association. He recommended Lord Lucan to install a "governor" at £40.

Lord Lucan, giving evidence, said he never thought that more than £10 for each stove would be charged, and he understood it was an inclusive charge.

An inspector of the Gas Light and Coke Company said that £27 to £30 would be a very good price for the goods supplied and work done by the plaintiff Company. Including fixing, £3 10s. was the Gas Light and Coke Company's charge for a "governor," against the £40 charged by the plaintiff.

Judge Tobin: In my judgment, plaintiff's methods of business are unpleasant, and the claim in this case is discreditable. As the defendant has paid £40 into Court, there will be judgment for Lord Lucan, with costs, from the time of payment into Court.

Parliamentary Intelligence

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Mid-Southern District Utility Bill has been read a third time, passed without amendment, and is awaiting Royal Assent. The Lowestoft Water and Gas Bill, returned from the Commons with amendments, has been again considered and passed, and is awaiting the Royal Assent. The Royston and Brodsworth Gas Bill has been reported from the Committee with amendment, and is awaiting consideration on report.

Special Orders.

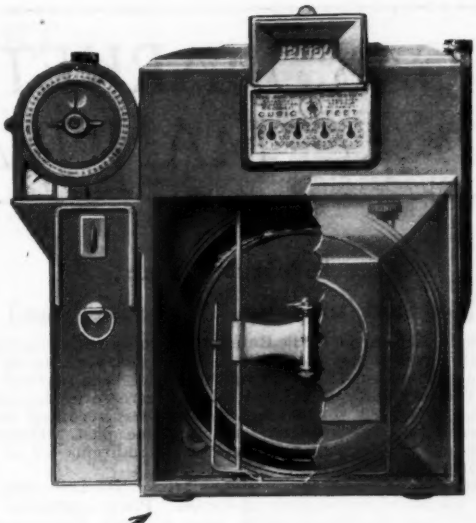
The Pontardulais Gas Order has been laid before the House and referred to the Special Orders Committee. The Stroud Gas Order and the Northampton Gas Order have been passed by the Special Orders Committee and approved by the House.

House of Commons.

Private Bills.

The Gas Light and Coke Company Bill has been read a second time and referred to a Committee. The Ministry of Health Provisional Orders Bill, dealing with the Stretford and District Gas Board, has been read a second time and committed.

The following Committee has been appointed to consider the Sheffield Gas Bill, and its rival scheme, the South Yorkshire Gas Network Bill: Sir William Jenkins (Chairman), Mr. Hanbury, Sir Walter Preston, and Mr. Rowson. The Committee meets at 11 a.m. on Wednesday, June 3.



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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The reduction in the Bank Rate on Thursday last from 3 p.ct., at which figure it has stood since May 1 last year, to 2½ p.ct. has brought it down to a level which has not been reached since 1909. The immediate result was a large increase in the support given to gilt-edged stocks, and the business recorded in this department was the heaviest for some time past. There was little change, however, in the depressed conditions for so long prevalent in other sections.

Gas stocks and shares were particularly active last week, and a large volume of business was recorded. Prices continued firm, and, with two exceptions, there were no wide fluctuations in value. Among ordinary stocks to show improvement, Brighton and Hove 5 p.ct. gained 2 points to 104-107, and Wandsworth rose 1 point to 113-116. On the other hand, Imperial Continental capital stock was marked down 10 points, and Montevideo, on the reduced dividend announcement, 5 points to 90-100. Gas Light 3 p.ct. debenture and Primitiva 4 p.ct. debenture both gained 1 point, while a fractional improvement was recorded by Bournemouth preference stock.

The Directors of the Cape Town and District Gas Light and Coke Company, Ltd., report a profit for the year 1930 of £21,217, which, with the amount brought forward, makes a total of £26,076 (against £26,872). After providing for the dividend on preference shares, the interim dividend of 3 p.ct. on the ordinary shares, and transfers to reserves, there remains an available balance of £9576, out of which the Directors recommend the payment of a final dividend on the ordinary shares of 4 p.ct. (against 5 p.ct.). The report states that the adverse conditions existing in Cape Town have necessarily affected the Company's business, particularly during the last half of the year, and, in the circumstances, the fact that the sales of gas equalled those of the previous year is a satisfactory feature. A reduction in the price of gas from Jan. 1, 1930, caused a decrease in receipts, and residuals also realized slightly less, but these decreases were to some extent off-set by savings in expenditure.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 18.

The values of tar products are as follows:

Pitch, 45s. per ton f.o.b.

Creosote, for export to U.S.A., 5½d. per gallon f.o.b.

Pure toluole, 1s. 11d. to 2s. per gallon; pure benzole, 1s. 6d. to 1s. 7d. per gallon; 95/160 solvent naphtha, 1s. 4d. to 1s. 5d. per gallon; and pyridine bases, 3s. 3d. to 3s. 6d. per gallon.

All prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

May 18.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 21s. 6d. Pitch—East Coast, 42s. 6d. to 43s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 42s. 6d. to 43s. 6d. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 7¾d. Coal-tar crude naphtha, in bulk, North, 5¾d. to 6¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5⅝d. to 5¾d. Carbolic acid, 60's, 1s. 1d. to 1s. 2d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May* 16.

Trading continues on moderate lines, but quotations are irregular.

Pitch.—Value is nominal at 37s. 6d. per ton f.o.b. Glasgow. Home price is 37s. 6d. per ton f.o.r. works in bulk.

Refined tar to Ministry of Transport Specification continues to leave the works in large quantities; but prices are easy at 2⅝d. to 2¾d. per gallon f.o.r. in buyers' packages.

Creosote.—Comparatively few orders have been placed, but quotations are steady. B.E.S.A. Specification is 2¾d. to 3d. per gallon; low gravity, 3½d. to 3¾d. per gallon; and neutral oil 3¼d. to 3⅜d. per gallon—all f.o.r. in bulk.

Cresylic.—With orders scarce, stocks are again increasing. To-day's values are lower. Pale, 97/99 p.ct., 1s. 2¼d. to 1s. 3½d. per gallon; dark, 97/99 p.ct., 1s. 1½d. to 1s. 2¼d. per gallon; and pale, 99/100 p.ct., 1s. 4½d. to 1s. 5½d. per gallon—all f.o.r. makers' works.

Crude naphtha.—Makers' quotations are steady at 4¼d. to 4⅜d. per gallon f.o.r. in bulk.

Solvent naphtha.—90/160 grade is steady at 1s. 2d. to 1s. 3d. per gallon, but 90/190 grade is purely nominal at about 1s. per gallon.

Motor benzole.—Few orders are being placed, and value is 1s. 3d. to 1s. 4d. per gallon, *ex* works.

Pyridines remain quiet. 90/160 is 3s. to 3s. 3d. per gallon, and 90/140, 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s. d.		s. d.	
Crude benzole	0 7½	to	0 8½	per gallon at works
Motor ,, ...	1 2	,,	1 3	,, ,, ,,
Pure ,, ...	1 6	,,	1 7	,, ,, ,,

Contracts Advertised To-Day.

Coal.

The Skipton Gas Department invite tenders for the supply of coal. [Advert. on p. 512.]

The East Dereham Urban District Council invite tenders for gas coal. [Advert. on p. 512.]

The Bakewell Urban District Council invite tenders for the supply of coal. [Advert. on p. 514.]

The Ellesmere Port and Whitby Urban District Council invite tenders for gas nuts. [Advert. on p. 514.]

The Directors of the Gloucester Gas Light Company invite tenders for the supply of coal. [Advert. on p. 512.]

Condensers.

The Edinburgh Corporation Gas Department invite tenders for the supply and erection of water-tube condensers. [Advert. on p. 512.]

General Stores.

The Stockton-on-Tees Gas Department invite tenders for the supply of various stores. [Advert. on p. 512.]

Meters.

The Stockton-on-Tees Gas Department invite tenders for the supply of meters, &c. [Advert. on p. 512.]

Oxide of Iron (New and Spent).

The Gas Committee of the Rochdale Corporation invite tenders for the supply of new and the purchase of spent oxide of iron. [Advert. on p. 512.]

Pipes.

The Gas Committee of the Rochdale Corporation invite tenders for the supply of cast and wrought iron pipes and fittings. [Advert. on p. 512.]

Tar.

The Penrith Urban District Council invite tenders for the purchase of surplus tar produced at their gas-works. [Advert. on p. 512.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 15.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	77—82	...	...
522,992	"	"	4	4	Do. 4 p.c. Pref. ...	75—80	...	77⅞
1,551,868	"	Apl. 9	7⅞	7⅞	Alliance & Dublin Ord. ...	100—105	...	103¾—104
374,000	"	Jan. 8	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
522,655	"	Mar. 5	7	7	Barnet Ord. 7 p.c.	124—129	...	126—126½
300,000	1	Apl. 23	1/4½	1/9⅜	Bombay, Ltd.	16/6—18/6	...	17/9—18/3
174,500	10	Mar. 5	9	9	Bournemouth 5 p.c. ...	15—16	...	...
500,050	10	"	7	7	Do. B 7 p.c. ...	12½—13	...	...
439,160	10	"	6	6	Do. Pref. 6 p.c. ...	11¼—11⅝	+¼	11⅝
50,000	Stk.	Dec. 18	3	3	Do. 3 p.c. Deb. ...	60—63	...	63
162,025	"	"	4	4	Do. 4 p.c. Deb. ...	81—84	...	83
357,900	"	Mar. 19	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	114
371,880	"	"	6¾	6¾	Do. 5 p.c. Con.	104—107	+2	104½—106¼
1,287,500	"	Feb. 19	5	5	Bristol 5 p.c. max.	95—96*a*	...	...
120,420	"	Dec. 18	4	4	Do. 1st 4 p.c. Deb. ...	78—80*a*	...	...
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	78—80*a*	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	99½—100½*a*	...	...
855,000	"	Apl. 9	7	8	British Ord.	110—115	...	113½—114
100,000	"	Dec. 18	7	7	Do. 7 p.c. Pref.	110—115	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	74—77	...	...
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	...
160,000	"	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	95—98	...	...
100,000	10	Dec. 4	10	6	Cape Town, Ltd.	9½—10½	...	9⅝
100,000	10	May 7	4½	4½	Do. 4½ p.c. Pref. ...	6¾—7¼*	...	7⅛
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	72—77	...	...
626,860	"	Feb. 19	6	6	Cardiff Con. Ord.	96—99	...	...
237,860	"	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb. ...	97—100	...	...
157,150	"	Feb. 19	5	6½	Chester 5 p.c. Ord.	85—90*b*	...	...
98,936	1	May 7	†2/-	†2/-	Colombo, Ltd. Ord.... ...	28/-—33/-*	...	...
24,500	1	"	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	17/6—19/6*	...	...
609,204	1	Apl. 9	1/4⅛	15'27*d*	Colonial Gas Assn. Ltd. Ord.	16/-—18/-	...	...
296,053	1	"	1/7⅛	17'67*d*	Do. 8 p.c. Pref.	17/6—19/6	...	...
2,073,280	Stk.	Feb. 19	6	6	Commercial Ord.	93—96	...	94—96
475,000	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	57—60	...	...
787,560	"	Feb. 19	7	7	Croydon sliding scale ...	108—111	...	109
453,100	"	"	5	5	Do. max. div.	82—85	...	83—84½
542,270	"	Mar. 5	7	10	Derby Con.	120—123*c*	...	...
55,000	"	Dec. 18	4	4	Do. Deb.	65—70*c*	...	...
209,000	"	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	"	Mar. 19	†4	†6½	European, Ltd.	90—95	...	92—92½
18,953,033	"	Feb. 19	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	18/6—19/6*f*	...	18/9—19/1½
2,600,000	"	"	3½	3½	Do. 3½ p.c. max.	63—66	...	64½—66
4,294,691	"	"	4	4	Do. 4 p.c. Con. Pref. ...	78—81	...	80—81
5,694,095	"	Dec. 18	3	3	Do. 3 p.c. Con. Deb. ...	61—64	+1	62½—63½
3,642,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	101—104	...	103½—105½
2,500,000	"	—	—	—	Do. 4½ p.c. Red. Deb. ...	95—97	...	95½—96½
161,480	"	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	158—163	...	...
82,500	"	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	...	...
258,740	"	"	5½	5½	Do. 3½ p.c. Conv.	82—85	...	...
70,000	10	Oct. 9	§	10	Hongkong & China, Ltd. ...	13—14	...	13⅞—13⅞
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	91—94	...	...
2,436,594	"	Nov. 6	25	15	Imperial Continental Cap.	345—365	−10	341—367
223,130	"	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	78—83	...	...
235,242	"	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	127—130	...	...
2,145,907	"	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	99—100*b*	...	...
600,000	"	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	98½—100½*b*	...	...
165,736	"	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	128—133	...	...
63,480	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	54—57	...	...
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ...	6—6½	...	...
392,000	—	Apl. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	86—89	...	...
675,000	Stk.	Nov. 20	†8	†6	Montevideo, Ltd.	90—100	−5	...
2,061,315	"	Mar. 5	5	5⅔	Newcastle & Gateshead Con.	16/9—17/6*d*/	...	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	74—75*d*	...	...
691,705	"	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	67½—68½*d*	...	...
277,285	"	Nov. 5	5	5	Do. 5 p.c. Red. Deb.	98—100*d*	...	...
199,940	"	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	"	Feb. 5	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	"	Apl. 23	9	7	Oriental, Ltd.	100—105	...	101—102
60,000	5	13 May, '15	—	—	Ottoman	0—½	...	...
205,162	Stk.	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	...
424,416	"	Feb. 19	8	8	Portsm'th Con.Stk. 4 p.c.Std.	122—127	...	...
241,446	"	"	5	5	Do. 5 p.c. max. ...	78—81	...	...
686,312	"	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	85—88	+1	86½
389,813	"	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	85—88	+1	...
150,000	10	Apl. 9	6	6	San Paulo 6 p.c. Pref. ...	8—8½	...	8¼—8⅝
1,736,968	Stk.	Mar. 19	6½	6½	Sheffield Cons.	104—106*e*	+1	...
95,000	"	Jan. 8	4	4	Do. 4 p.c. Deb.	79—81*e*	...	...
90,000	10	June 5	‡4	‡5	South African	4—6	...	...
6,709,895	Stk.	Feb. 5	5	7½	South Met. Ord.	102½—104½	−1	103—103¾
1,135,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	112—115	...	...
1,895,445	"	Jan. 8	3	3	Do. 3 p.c. Deb. ...	60—63	...	61⅝—62½
734,000	"	Mar. 5	6½	6½	Do. 6¾ p.c. Red. Db.	98—100	...	...
1,000,000	"	Jan. 22	—	4	Do. 5 p.c. Red. Deb.	100—103	...	102—102½
91,500	"	Mar. 5	8½	8½	South Shields Con.	107—109*d*	...	...
1,543,795	"	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	102—105	...	...
668,837	"	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	100—102½
647,740	"	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	77—80	...	...
121,275	"	Dec. 18	4	4	Do. 4 p.c. Deb.	75—78	...	...
179,014	"	Mar. 5	8	8	Sutton Ord.	120—130	...	...
94,500	"	Jan. 8	5	5	Do. 5 p.c. Deb.	96—99	...	...
250,000	"	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	"	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	...	...
1,076,490	"	Mar. 5	6⅝	6⅝	Tottenham District Ord. ...	102—106	...	104½—105
150,000	"	"	5⅔	5⅔	Do. 5⅔ p.c. Pref. ...	101—104	...	105
199,005	"	Dec. 18	4	4	Do. 4 p.c. Deb. ...	77—80	...	...
85,701	"	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79	...	...
310,694	"	Mar. 5	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	105—106½
88,330	"	"	5	5	Do. 5 p.c. Pref. ...	88—93	...	...
1,322,220	"	Mar. 5	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	113—116	+1	114—116
426,000	"	"	5	5	Do. 5 p.c. Pref.	96—99	...	97—98½
1,013,464	"	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	101—102

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.ct. p.a. less tax and less tax on interim dividend.

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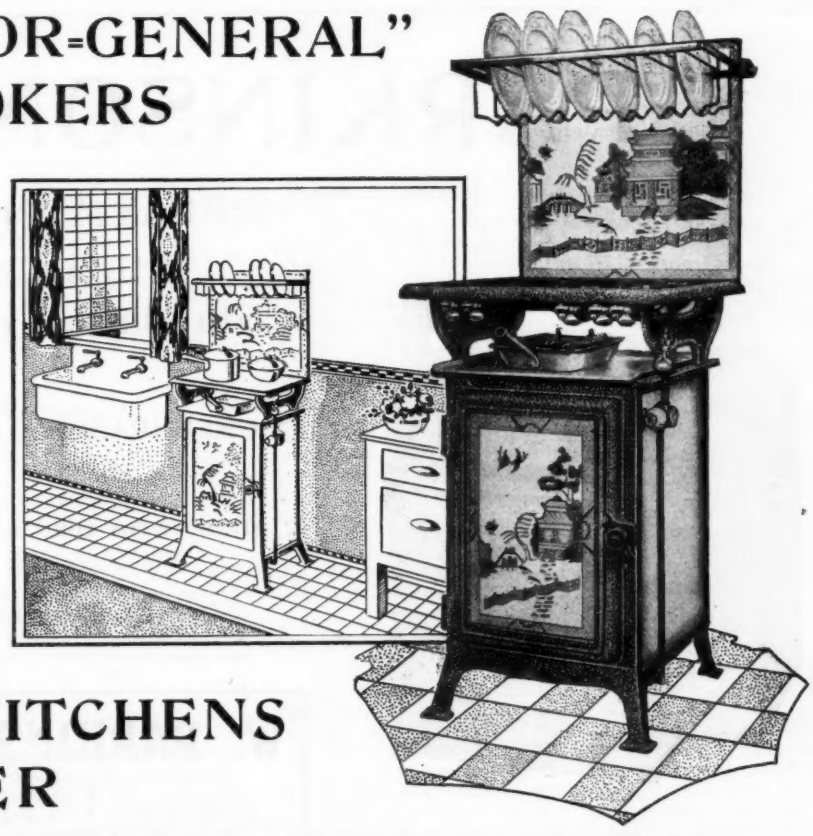

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